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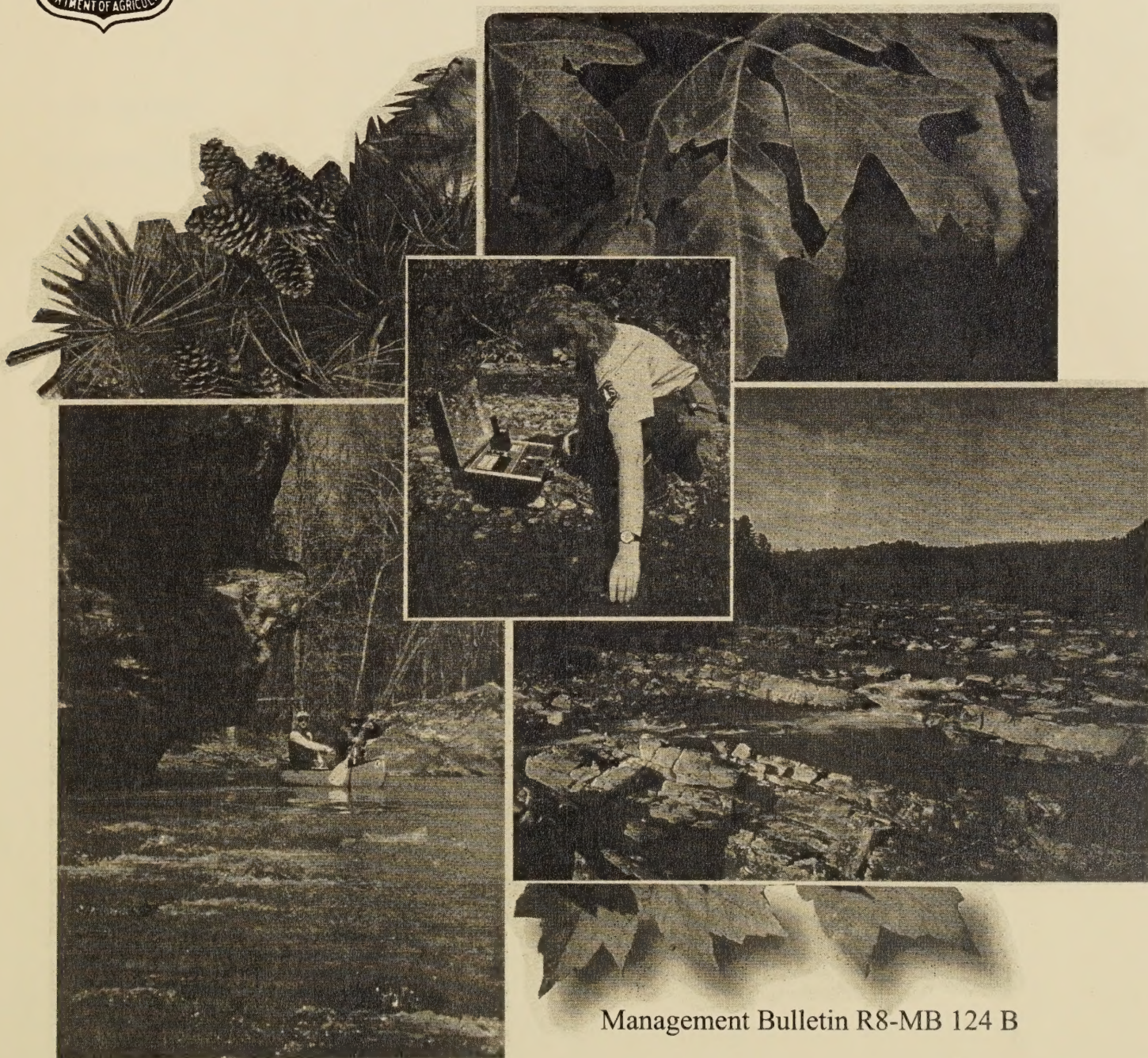
September 2005



Final Environmental Impact Statement

Revised Land and Resource Management Plan

Ouachita National Forest Arkansas and Oklahoma



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Final Environmental Impact Statement for the Revised Land and Resource Management Plan

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ABSTRACT

The Forest Service has revised the Land and Resource Management Plan (Forest Plan) for the Ouachita National Forest. This Final Environmental Impact Statement (FEIS) provides a detailed analysis of the five alternatives considered in revising the Forest Plan. Under the Selected Alternative, the 2005 Revised Forest Plan allocates land to 17 management areas, recommends additions to Flatside Wilderness, Poteau Mountain Wilderness, and Upper Kiamichi Wilderness, and identifies lands administratively available for oil and gas leasing and consents to lease (acquired lands) or sets no objection to leasing (Public Domain lands) through the Bureau of Land Management. The Revised Forest Plan re-affirms a recommendation that 16.5 miles of the Glover River in Oklahoma be considered for designation as a Wild and Scenic River. The R.R. Reynolds Research Natural Area (RNA) is established. The Revised Forest Plan contains management direction that cross-country travel by motorized vehicle is unsuitable. The alternatives examined in detail include the 1990 Amended Forest Plan and four alternatives that represent a range of projected vegetation management activities and wilderness recommendations. The Selected Alternative is Alternative E.

Executive Summary

The Forest Service has revised the Land and Resource Management Plan (Forest Plan) for the Ouachita National Forest. The purpose of the Forest Plan is to provide long-term, strategic direction for natural resource management on the Forest. Projects designed to implement the direction of the Forest Plan are undertaken only after additional, project-specific environmental analysis and public involvement.

The 2005 Revised Forest Plan replaces the 1990 Amended Forest Plan for the Ouachita National Forest. The need to revise this Forest Plan was driven by the National Forest Management Act (NFMA) requirement that such plans be revised at least every 15 years and by changing conditions and expectations identified in the Ozark-Ouachita Highlands Assessment, the Southern Forest Resource Assessment, and ongoing monitoring and evaluation results specific to the Ouachita National Forest.

Public Involvement and Issues

A Notice of Intent (NOI) to prepare an environmental impact statement (EIS) was published in the Federal Register on May 1, 2002, to formally initiate revision. At the same time, the formal public scoping period began. Written public comments were solicited and public meetings were held during the summer of 2002. Additional public meetings were held in the fall of 2003 and again in the spring of 2004. Plan Revision newsletters were periodically published and distributed to the Forest Plan mailing list (consisting of 2,500 individuals, groups, agencies, and organizations at its peak) during the planning process. As a result of this public involvement, the Forest Service was able to refine the issues concerning revision of the Forest Plan and future management of the Ouachita National Forest. Significant issues were grouped into four major issue categories, as follows.

Issue Category 1: Ecosystem Health and Sustainability

What forest management strategies and practices are needed to maintain or improve ecosystem health and sustainability? The four major areas of concern for this issue category are:

- Oak Decline and Mortality
- Viability of Threatened, Endangered, and Other Species of Concern
- Use of Prescribed Fire in Vegetation Management
- Use of Uneven-aged and Irregular Even-aged Silvicultural Systems

Issue Category 2: Land Use Designations

What is the appropriate balance and combination of land use designations? The three areas of concern for this category are:

- Changes needed in definitions and standards for Management Area 9 (water and riparian areas)
- Roadless areas that may be eligible and suitable for wilderness recommendation(s) (36 CFR 219.17)
- Changes needed for suitability determinations, including lands suitable for timber production (36 CFR 219.14(d)) [For the Ouachita National Forest, the required 10-year review of lands not suitable for timber production is being accomplished with this revision.]

Issue Category 3: Public Access and Recreational Activities

How should the Forest provide public access while safeguarding ecosystem health? The four areas of concern for this category are:

- Changes needed in management standards and desired conditions for the transportation system within the Ouachita National Forest, including road densities
- Changes needed to address existing and likely future conflicts among dispersed recreation activities
- The mix of developed and dispersed recreation opportunities on the Forest
- Forest Plan direction concerning the off road use of motorized vehicles

Issue Category 4: Relationship of the National Forest to Communities

What forest management direction should be implemented to support community development needs in and around the Ouachita National Forest? The three areas of concern for this category are:

- Changes in harvest levels and their projected effects on local economies
- Effects of recreation, wildlife-related activities, and tourism on local economies
- Effect of fuels management within the National Forest in relation to communities at risk

Management Areas

Management Areas (MA) for the Ouachita National Forest are geographically defined areas with unique characteristics and different desired conditions accompanied by forest-wide and (normally) MA-specific management standards. In all alternatives except A (No Action Alternative), a slightly revised set of MAs and MA descriptions is used. The MAs for Alternative A are the same as the 1990 Forest Plan. Table ES.1 compares the MAs for the action alternatives to the MAs in the 1990 Forest Plan (Alternative A).

Table ES.1 Management Areas for Alternatives B, C, D, and E compared to 1990 Plan

Management Areas (MAs) for Alternatives B, C, D, and E	Management Areas (MAs) for Alternative A (1990 Amended Forest Plan)
MA 1: Wilderness (1a); Poteau Mountain (1b), Recommended Wilderness Addition (1c)	MA 1: Wilderness; MA 1a: Poteau Mountain
MA 2: Special Interest Areas: Scenic Areas (2a); Watchable Wildlife Areas (2b); Rich Mountain and South Fourche Botanical Areas (2c); Rich Mountain Recreation Area (2d)	MA 2: Scenic Areas
MA 3: Developed Recreation Areas	MA 3: Recreation Sites
MA 4: Research Natural Areas and National Natural Landmarks	MA 4: Research Natural Areas and National Natural Landmarks
MA 5: Experimental Forests	MA 5: Alum Creek and Crossett Experimental Forest
MA 6: Rare Upland Communities	MA 6: Threatened, Endangered or Sensitive Species Habitat
MA 7: Ouachita Seed Orchard	MA 7: Ouachita Seed Orchard
MA 8: Administrative Sites/Special Uses	MA 8: Administrative Sites
MA 9: Water and Riparian Communities	MA 9: Water and Riparian Areas
MA 10: Reserved	MA 10: Non-Forest
MA 11: Reserved	MA 11: Not Appropriate for Timber Production
MA 12: Reserved	MA 12: Unproductive
MA 13: Reserved	MA 13: Ouachita Mountains, Unsuitable Lands Based on Other Resource Coordination
MA 14: Ouachita Mountains, Habitat Diversity Emphasis	MA 14: Ouachita Mountains, Lands Suitable for Timber Production
MA 15: West Gulf Coastal Plain, Habitat Diversity Emphasis	MA 15: Coastal Plain
MA 16: Lands Surrounding Lake Ouachita and Broken Bow Lake	MA 16: Lake Ouachita
MA 17: Semi Primitive	MA 17: Semi-Primitive Motorized
MA 18: Reserved (scenery management addressed Forest-wide)	MA 18: Visually Sensitive Foreground Areas, Roads And Trails
MA 19: Winding Stair Mountain National Recreation Area (and Associated Non-Wilderness Designations)	MA 19: Winding Stair Mountain National Recreation and Wilderness Area (OK) and Rich Mountain Recreation and Black Fork Wilderness Area (AR)
MA 20: Wild and Scenic River Corridors	MA 20: Wild and Scenic River Corridors
MA 21: Old Growth Restoration	MA 21: Old Growth Restoration
MA 22: Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat	MA 22: Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem And Red-cockaded Woodpecker Habitat
MA 23: Reserved – Broken Bow Lake MA was incorporated with Lake Ouachita MA in MA 16	MA 23: Broken Bow Lake (NF lands above)

Alternatives

The Plan Revision Interdisciplinary (ID) Team developed a broad range of Forest Plan alternatives to address the significant issues. Seven draft alternatives were presented to the Forest Leadership Team (FLT) in January 2004. After review and discussion, the FLT directed the ID Team to carry forward three of the seven draft alternatives for detailed analysis and to merge two others into one. Two of the seven draft alternatives—the minimum level of management and the maximum production potential—were eliminated from detailed consideration and used only for analysis benchmarks.

The FLT determined that four alternatives (plus the present Forest Plan as the No Action Alternative) were sufficient to address the need for change and the significant issues. The range of alternatives considered in detail in this FEIS reflects the relatively modest need for change and the nature of the significant issues identified.

Alternative A (1990 Plan) would make no changes in management direction in the 1990 Amended Forest Plan, as amended through 2005. Management Areas (MAs), projected resource management actions, and all other Plan components would remain unchanged. The 1990 Forest Plan, as amended, would continue to be implemented. This alternative is the No Action Alternative and serves as a baseline to which the other alternatives are compared.

Alternative B would make no major adjustments to management direction in the 1990 Amended Forest Plan, as amended through 2005. Changes would be limited to those needed to comply with pertinent changes in law and policy; update projections for acres of prescribed burning, thinning, and regeneration harvests; adjust the Forest Plan to the new model format; and make cross-country travel by motorized vehicle unsuitable; and remove obsolete or unnecessary direction.

Alternative C would place the most emphasis on active management for ecosystem health. Management activities would focus on restoring and maintaining native pine-grass, oak woodland, and other fire and disturbance dependant ecosystems. Activities such as prescribed burning and thinning would be more intensive than the other alternatives. Three additions to existing wildernesses would be recommended: 620 acres to the Flatside Wilderness in Arkansas, 77 acres to the East Unit of Poteau Mountain Wilderness in Arkansas, and 1,096 acres to the Upper Kiamichi Wilderness in Oklahoma. Cross-country travel by motorized vehicles, including OHVs, would be unsuitable.

Alternative D would increase emphasis on recreation opportunities, scenery management, and wilderness designation, while focusing ecosystem health activities in support of wildlife based recreation. Compared to the 1990 Forest Plan (Alternative A), this alternative would maintain or make modest changes in projections for most forms of forest management, with increases in prescribed burning and thinning in MA 21-Old Growth Restoration (Pine-Grass Emphasis) and 22-Renewal of the Shortleaf Pine-Bluestem Ecosystem and Red-Cockaded Woodpecker Habitat, walk-in turkey hunting areas, and cooperative wildlife management areas. This alternative would not thin as many acres as Alternatives C or E. Recommended increases in wilderness designation would total approximately 30,100 acres, including the three additions described in Alternative C and three new areas: Brush Heap, Blue Mountain, and Irons Fork, all located in Arkansas. Alternative D would make cross-country travel by motorized vehicles, including OHVs, unsuitable but would differ from other alternatives by treating OHV-based retrieval of big game as a suitable use.

Alternative E (Selected Alternative) would balance increased emphasis on recreation and ecosystem health with retention of practices that have proven effective over time by combining elements from Alternatives B, C, and D. This would include increased intensive management for native pine-grass, oak woodland, and other fire- and disturbance-dependant ecosystems. Activities such as prescribed burning and thinning would be more intensive than in Alternative B and more dispersed than in Alternative D, but less intense than Alternative C. Recommended wilderness additions would be the same as those in Alternative C. Cross-country travel by motorized vehicles, including OHVs, would be unsuitable.

Alternatives are described in more detail in Chapter 2.

Public Involvement

The public was encouraged to review and submit comments, concerns, and suggestions concerning the Draft EIS and proposed Revised Forest Plan during the formal 90-day comment period, which began February 25, 2005, with the publication of the Notice of Availability (NOA) of the Draft EIS in the Federal Register. The comment period ended May 27, 2005. A detailed description of public involvement activities during forest plan revision is provided in Appendix A of this Final Environmental Impact Statement (FEIS), as are comments received during the 90-day comment period and responses to those comments

Summary Conclusion

The FEIS provides a detailed analysis of alternatives for revising the Land and Resource Management Plan of the Ouachita National Forest. Under the selected alternative, the 2005 Revised Forest Plan allocates land to 17 management areas; recommends increases to Flatside Wilderness, Poteau Mountain Wilderness, and Upper Kiamichi Wilderness; and identifies lands administratively available for oil and gas leasing and consents to lease (acquired lands) or sets no objection to leasing (Public Domain lands) through the Bureau of Land Management. The Selected Alternative re-affirms a recommendation that 16.5 miles of the Glover River in Oklahoma be considered for designation as a Wild and Scenic River. The R.R. Reynolds Research Natural Area (RNA) is established. The Selected Alternative contains management direction that cross-country travel by motorized vehicle is unsuitable. The alternatives examined in detail include the 1990 Amended Forest Plan and four alternatives that represent a range of projected vegetation management activities and wilderness recommendations. The Selected Alternative is Alternative E.

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Chapter 1—Purpose and Need

Document Structure

The Forest Service prepared this Final Environmental Impact Statement (FEIS) in compliance with the National Environmental Policy Act (NEPA) and other relevant laws and regulations. This FEIS discloses the direct, indirect, and cumulative environmental impacts that would result from implementation of each of the five alternatives documented in detail. The document is organized into five chapters:

Chapter 1. Purpose and Need: This chapter includes information on the history of this Forest Plan revision and the purpose of and need for the revision. This section also details how the Forest Service informed the public about Plan revision and how the public responded.

Chapter 2. Alternatives: This chapter provides a detailed description of the five alternatives that the agency has evaluated for achieving the stated purpose of Plan Revision. These alternatives were developed based on significant issues raised by the public and other agencies and internal management concerns. Chapter 2 provides summary tables that compare the environmental consequences of each alternative.

Chapter 3. Affected Environment and Environmental Consequences: This chapter describes the environmental conditions of the Forest and the environmental effects of implementing each of the five alternatives. This chapter is organized by major environmental components.

Chapter 4. List of Preparers: This chapter provides a list of preparers of this FEIS.

Chapter 5. Distribution List: This FEIS was distributed to the agencies, organizations, and individuals listed in this chapter (as required by NEPA).

Appendices: The appendices provide more detailed information to support the analyses presented in the FEIS.

Additional documentation may be found in the administrative record located at the Forest Supervisor's Office in Hot Springs, Arkansas.

Purpose of and Need for Action

The Forest Service proposed to revise the Land and Resource Management Plan (Forest Plan) for the Ouachita National Forest in 2002. This Forest Plan provides long-term, strategic direction for natural resource management on the Forest. Projects designed to implement the direction of the Forest Plan are undertaken only after additional, project-specific environmental analysis and public involvement.

The Forest Service published the Amended Forest Plan for the Ouachita National Forest in 1990 (replacing the 1986 Forest Plan). The Amended Forest Plan was 15 years old in March 2005. Part of the need to revise the Forest Plan is that the National Forest Management Act (NFMA) calls for such plans to be revised every 10 to 15 years. The need to revise this Forest Plan was also driven by the changing conditions identified in the Ozark-Ouachita Highlands Assessment, the Southern Forest Resource Assessment, and ongoing monitoring and evaluation results specific to the Ouachita National Forest.

Decision Framework

The Forest Service allocates resources and makes resource management decisions concerning National Forest System lands in two stages. In Stage One, the Forest Plan allocates lands and resources to various uses and desired conditions by establishing forest-wide and Management Area-specific direction. Site-specific project management decisions are made in Stage Two. Forest Plans do not obligate the agency to undertake site-specific projects; rather, they establish desired conditions, objectives, and design criteria for projects. Forest Plans also set limitations on what actions may be authorized and what conditions must be met during project-level decision-making. Authorization of site-specific projects must comply with NEPA procedures.

The primary decisions made in a Forest Plan include:

- Establishment of Forest-wide multiple-use goals (desired conditions) and objectives (36 CFR 219.11(b))
- Establishment of Forest-wide management requirements (36 CFR 219.13 to 219.27)
- Establishment of Management Areas and associated management standards (36 CFR 219.11(c))
- Determination of land that is suitable for the production of timber (16 U.S.C. 1604(k) and 36 CFR 219.14)
- Establishment of an allowable sale quantity (ASQ) for timber within a time frame specified in the Forest Plan (36 CFR 219.16)
- Establishment of monitoring and evaluation requirements (36 CFR 219.11(d))
- Recommendations for potential wilderness areas or wilderness additions (36 CFR 219.17)
- Designation of lands administratively available for oil and gas leasing and consent to the Bureau of Land Management to offer specific lands for leasing (36 CFR 228.102(d) and (e)); authorization of actual site-specific projects must comply with NEPA procedures

The Regional Forester is the Responsible Official who decides which alternative best meets the overall needs of the Ouachita National Forest and the people of the United States

Relevant Planning Documents

The following documents contain environmental analyses and assessments that are not repeated in the FEIS, but provide supporting documentation for the analysis and some Forest Plan decisions:

- *Final Environmental Impact Statement for the Suppression of the Southern Pine Beetle* (USDA Forest Service, Southern Region 1987)
- *Final Environmental Impact Statement for Vegetation Management in the Ozark-Ouachita Mountains* (USDA Forest Service, Southern Region 1990) and its supplement in 2002
- *Final Environmental Impact Statement for the Management of the Red-cockaded Woodpecker and Its Habitat on National Forests in the Southern Region* (USDA Forest Service, Southern Region 1996)
- *Ozark-Ouachita Highlands Assessment* (USDA Forest Service, Southern Region 1999)
- *Southern Resource Assessment* (USDA Forest Service, Southern Region 2002)
- *Final Environmental Impact Statement for an Amendment to the Land and Resource Management Plan—Management Direction for Acquired Lands in Southeastern Oklahoma (Ouachita National Forest)* (USDA Forest Service, Southern Region 2002)

Copies of these documents are available for review at the Forest Supervisor's Office in Hot Springs, Arkansas.

The Planning Process

Forest Plan revision is part of the national forest planning framework. In addition to NFMA, the Government Performance and Results Act of 1993 and the 2004 Revision of the USDA Forest Service Strategic Plan provide broad direction for Forest Plan revision. This FEIS, like the Revised Forest Plan it supports, was developed according to the NFMA implementing regulations at 36 Code of Federal Regulations (CFR) 219 (September 30, 1982, as amended), the National Environmental Policy Act of 1969, and the Council of Environmental Quality regulations at 40 CFR 1500-1508. The FEIS discloses the environmental consequences of each alternative and how each would respond to the significant issues identified.

Planning steps required by NFMA include:

- Identification of significant issues (including concerns and opportunities)
- Development of planning criteria
- Inventory of resources and data collection
- Analysis of the Management Situation
- Formulation of alternatives
- Estimation of effects of alternatives
- Evaluation of alternatives
- Recommendation of the preferred alternative
- Approval and implementation
- Monitoring and evaluation

The Forest Service's 10-step planning process is described in 36 CFR 219.10. The results of Steps 1 through 8 are disclosed in Chapters 1 through 3. The Ouachita National Forest's Plan Revision Team holds responsibility for developing the 2005 Revision. Efforts were made to provide detailed explanations of each step of the revision in the form of process (planning) records. Process records are on file in the Forest Supervisor's Office in Hot Springs, Arkansas. To review these records, contact: Ouachita National Forest Supervisor's Office, P.O. Box 1270, Hot Springs, AR 71902; Telephone: 501-321-5202.

Summary of Public Involvement

The Notice of Intent (NOI) to begin the revision process and the formal public scoping period was published in the Federal Register on May 1, 2002. Written public comments were received and logged in at the Forest Supervisor's Office in Hot Springs, Arkansas, during the formal public scoping period of May 1 through August 2, 2002. Four public meetings were conducted in June 2002 to provide information about the revision process and to solicit public comment.

In September and October 2003, two series of public meetings ("open house" format) were conducted in various locations across the Ouachita Mountains. The first series provided forums for discussion of off-highway vehicle use on the Forest, considered one of the most important issues for Forest Plan revision. The second series of meetings focused on key inventory data for Forest Plan revision, including scenic quality, species viability, roads analysis, and roadless areas. In April 2004, three more public open houses were held to invite feedback and discussion concerning the draft alternatives for the proposed Revised Forest Plan.

Plan Revision newsletters were periodically published and distributed to the Forest Plan mailing list (consisting of 2,500 individuals, groups, agencies, and organizations at its peak) during the planning process. The proposed Revised Forest Plan and accompanying DEIS were made available for review by the public, other agencies, tribal officials, and other elected officials on February 25, 2005; comments regarding the Forest Plan documents were accepted if they were postmarked (or email dated) by May 27, 2005. In addition to distributing hard copies of the draft documents to those who requested them, three public meetings were held to provide information on how to comment. The Forest Supervisor made copies available to all interested parties on the Ouachita National Forest website and on compact discs and widely advertised the availability of all forms of the plan documents to the public, other agencies, Indian tribes, and elected officials. See Appendix A for additional information regarding public involvement in this process. Appendix A also includes a summary of substantive comments received and Forest Service responses to those comments. Comment letters from other federal and state agencies and elected officials are reproduced in their entirety.

Release of the Revised Plan and FEIS

After the comment period for the DEIS ended, all comments received were analyzed, considered, and responded to in the Final Environmental Impact Statement (FEIS).

Significant Issues

After scoping, all elements identified in the Notice of Intent remained important; however, the categories used to organize the issues changed. The issue of Ecosystem Health and Sustainability was unchanged. Silvicultural Practices was included under this category along with other elements that were identified during scoping rather than keeping silvicultural practices a separate issue. The category of Roadless Areas, Recreation, and Motorized Access was separated into two categories, with the Roadless Areas issue moved to a new category called Land Use Designations. Recreation and Motorized Access issues were placed in a category called Public Access. The Relationship of National Forest Management to Local Communities and Economies was renamed Relationship of the National Forest to Communities. The significant issues identified by the Forest Service and examined in this FEIS are further refined as shown below.

Issue Category: Ecosystem Health and Sustainability

What forest management strategies and practices are needed to maintain or improve ecosystem health and sustainability?

Four major areas of concern for this issue category are addressed by the Forest Plan:

- Oak Decline and Mortality
- Viability of Threatened, Endangered, and Other Species of Concern
- The Use of Prescribed Fire in Vegetation Management
- The Use of Uneven-aged and Irregular Even-aged Silviculture

The Forest Plan addresses the following:

- Changes needed in management direction for maintaining or restoring healthy forest ecosystems in the face of new threats from insect outbreaks and diseases (36 CFR 219.27), including oak decline and mortality
- Changes needed in Forest Plan direction for maintaining habitats for viable populations of native plant and animal species (36 CFR 219.19)
- Changes needed in air, soil, and water quality standards
- Changes needed in the standards for implementing different reproduction cutting methods and other silvicultural practices and the predicted levels at which such methods and practices would be implemented on the Ouachita National Forest

Issue Category: Land Use Designations

What constitutes the appropriate balance and combination of land use designations?

Wilderness Recommendations

Six inventoried roadless areas that were initially identified during the 1978 RARE II were reanalyzed for roadless characteristics and the two that still met roadless criteria were evaluated for their wilderness potential. In addition, six other inventoried roadless areas identified were evaluated for wilderness potential per 36 CFR 219.17. Alternatives C and E would recommend additions to Flatside, Upper Kiamichi, and Poteau Mountain Wildernesses. Alternative D would recommend the same three additions, plus creation of three new wilderness areas: Blue Mountain, Brush Heap and Irons Fork.

Riparian Areas

Under the 1990 Amended Forest Plan, water and riparian areas were designated as Management Area (MA) 9. These areas also overlapped or were included within other designated management areas. Amendment 12 (July 22, 1993) moved riparian areas from most management areas into MA 9. Lands and waters within MA 9 include at least 100 feet from both edges of all perennial streams and the shores of bodies of water greater than ½-acre in size and variable distances, but at least 30 feet from both edges of other streams with defined stream channels. Lands in MA 9 are unsuitable for timber production. As direction for this MA has been implemented, needs to clarify the associated management standards have emerged.

The Forest Plan addresses the following:

- Changes needed in definitions and standards for MA 9 (water and riparian)
- Roadless areas that may be eligible and suitable for wilderness recommendation(s) (36 CFR 219.17)
- Changes needed for suitability determinations, including lands suitable for timber production (36 CFR 219.14(d)) [For the Ouachita National Forest, the required 10-year review of lands not suitable for timber production is being accomplished with this revision.]

Issue Category: Public Access and Recreational Activities

How should the Forest provide public access while safeguarding ecosystem health?

Included within this category is public access to the Forest for recreational opportunities, including off-highway vehicle use. The Revised Forest Plan was informed by a forest-wide roads analysis (36 CFR 212.5) and by consideration of the work of the National Off Highway Vehicle (OHV) Policy and Implementation Teams.

Transportation System

Road density (miles of open road per square mile of surface area) varies across the Forest. The Revised Forest Plan provides updated direction for managing a road system suitable for land and resource management activities and public access while limiting impacts to wildlife, soil, and water resources.

Recreation Opportunities

According to Report 4 of the Ozark-Ouachita Highlands Assessment (USDA Forest Service, Southern Research Station 1999), recreation participation in nearly all activities increased on the national forests of the Ozark-Ouachita Highlands from 1986 to 1996, with the most dramatic increases—measured in terms of percent change—occurring in bicycling (most likely mountain biking), horseback riding, and the use of OHV's. In terms of actual participation rates, the five most popular outdoor recreation opportunities on these national forests were sightseeing, camping, hunting, fishing, and hiking. In the South, "participation in most activities is projected to increase significantly more than the Nation as a whole." Primitive camping and hunting are projected to decline somewhat.

Where recreation demands conflict, increased user complaints and environmental impacts are expected. In addition to the kinds of conflicts and problems associated with dispersed recreation activities (those not taking place in highly developed recreation areas), there are concerns about the costs of maintaining developed recreation areas on the Ouachita National Forest. Some of these recreational facilities are deteriorating because of their age and/or heavy use. Lack of sufficient funds to maintain and repair them points to a need to close some areas and strictly limit development of new ones.

Off-Highway Vehicle Use

Cross-country OHV travel is a suitable use over large portions of the Ouachita National Forest under the 1990 Forest Plan. Areas of concentrated use where OHV impacts pose persistent problems include Wolf Pen Gap Trail, Little Missouri River watershed, the Lake Ouachita area, and many utility rights-of-way. User conflicts, such as those experienced when some hunters and hikers encounter OHV riders, are increasing as demands for OHV access increase. The 1990 Forest Plan direction includes guidelines to "provide for Off-Highway vehicle use" and "designate special areas for OHV use." Alternatives B, C, D, and E include management direction that cross-country travel by motorized vehicles is unsuitable with Alternative D including an exception for cross-country travel for game retrieval.

The Forest Plan addresses the following:

- Changes needed in management standards and desired conditions for the transportation system within the Ouachita National Forest
- Changes needed to address existing and likely future conflicts among dispersed recreation activities
- The mix of developed and dispersed recreation opportunities on the Forest
- Forest Plan direction concerning use of motorized vehicles

Issue Category: Relationship of the National Forest to Communities

What forest management direction should be implemented to support community development needs in and around the Ouachita National Forest?

Communities near the Ouachita National Forest are affected by the condition and management of these public lands and the opportunities for recreational and business-enhancing activities they present. Such communities have a special relationship with the National Forest, as implied by the National Forest-Dependent Rural Communities Economic Diversification Act of 1990, which directs the Forest Service to help national forest-dependent communities organize, plan, and implement actions that diversify local economies.

Timber production has important economic impacts in some communities near the Ouachita National Forest. Many also recognize benefits to their economies and quality of life from national forest management of recreation activities, recreation settings, visual quality, tourism, water, range, and wildlife. The Forest Service, partner agencies, and local governments are also concerned about the potential impacts on communities at risk from wildfires spreading from the National Forest. Fuel levels are an important influence on rural communities; therefore, the manner in which the National Forest maintains forest fuels was an important issue. Changes included in alternatives with the potential to affect the National Forest's ability to support long-term community development needs in the vicinity of the Ouachita National Forest included management direction that would make cross-country travel by motorized vehicle unsuitable, an increase in allowable sale quantity, and an increased program of prescribed fire.

Communities expressed a keen interest in management of the Ouachita National Forest, particularly in the areas of allowing timber production and suitability of the Forest for cross-country travel. There are trade-offs between providing benefits to communities from timber production versus providing benefits to communities from recreation and tourism opportunities.

The Forest Plan addresses the following:

- Changes in harvest levels and their projected effects on local economies
- Effects of recreation, wildlife-related activities, and tourism on local economies
- Effect of fuels management within the national forest in relation to communities at risk

Other (Non-Significant) Issues

In addition to the significant issues, the Revised Forest Plan addresses the following issues:

- Management Area definitions and boundaries
- Visual management
- Priorities for land acquisition and disposal
- Preservation of Heritage Resources
- Monitoring of Forest Plan objectives and standards
- Water and riparian management
- Allowable Sale Quantity (ASQ) for timber
- Wild and Scenic River corridor eligibility
- Old growth standards and direction

Chapter 2—Alternatives

Introduction

Chapter 2 describes the No Action Alternative (the 1990 Forest Plan) and four action alternatives. The five alternatives analyzed in detail are summarized briefly as part of this introduction. Chapter 2 displays, in comparative form, the predicted effects of the alternatives on the quality of the environment. Details are discussed in Chapter 3 (Affected Environment and Environmental Consequences). This summary provides a basis for choice among the alternatives. Summary tables showing how alternatives compare are presented near the end of this chapter. Following are brief descriptions of each alternative; more detailed descriptions are presented later in this chapter.

Alternative A (1990 Plan) would make no changes in management direction in the 1990 Amended Forest Plan, as amended through September 2005. Management Areas (MAs), projected resource management actions, and all other Plan components would remain unchanged. The 1990 Forest Plan, as amended, would continue to be implemented. This alternative is the No Action Alternative and serves as a baseline to which the following alternatives are compared. An updated version of the 1990 Amended Forest Plan, incorporating all amendments, is available at the following website: <http://www.fs.fed.us/r8/ouachita>.

Alternative B would make no major adjustments to management direction in the 1990 Amended Forest Plan, as amended through 2005. Changes would be limited to those needed to comply with pertinent changes in law and policy; update projections for acres of prescribed fire, thinning, and regeneration harvests; adjust the Forest Plan to the new model format; and make cross-country travel by motorized vehicle unsuitable; and remove obsolete or unnecessary direction.

Alternative C would place the most emphasis on ecosystem health. Management activities would focus on restoring and maintaining native pine-grass, oak woodland, and other fire and disturbance dependant ecosystems. Activities such as prescribed fire and thinning would be more intensive than the other alternatives. Three additions to existing wildernesses would be recommended: 620 acres to the Flatside Wilderness in Arkansas, 77 acres to the East Unit of Poteau Mountain Wilderness in Arkansas, and 1,096 acres to the Upper Kiamichi Wilderness in Oklahoma. Cross-country travel by motorized vehicles, including OHVs, would be unsuitable.

Alternative D would increase emphasis on recreation opportunities, scenery management, and wilderness designation, while focusing ecosystem health activities in support of wildlife based recreation. Compared to the 1990 Forest Plan (Alternative A), this alternative would maintain or make modest changes in projections for most forms of forest management, with increases in prescribed fire and thinning in MA 21-Old Growth Restoration (Pine-Grass Emphasis) and 22-Renewal of the Shortleaf Pine-Bluestem Ecosystem and Red-Cockaded Woodpecker Habitat, walk-in turkey hunting areas, and cooperative wildlife management areas. This alternative would not thin as many acres as Alternatives C or E. Recommended increases in wilderness designation would total approximately 30,100 acres, including the three additions described in Alternative C and three new areas: Brush Heap, Blue Mountain, and Irons Fork, all located in Arkansas. Alternative D would make cross-country travel by motorized vehicles, including OHVs, unsuitable but would differ from other alternatives by treating OHV-based retrieval of big game as a suitable use.

Alternative E would balance increased emphasis on recreation and ecosystem health with retention of practices that have proven effective over time by combining elements from Alternatives B, C, and D. This would include increased intensive management for native pine-grass, oak woodland, and other fire and disturbance dependant ecosystems. Activities such as prescribed fire and thinning would be more intensive than in Alternative B and more dispersed than in Alternative

D, but less intense than Alternative C. Recommended wilderness additions are the same as those in Alternative C. Cross-country travel by motorized vehicle would be unsuitable.

Alternative Development

Alternatives for the Revised Forest Plan were designed to respond to elements of the USDA Forest Service Strategic Plan for Fiscal Years 2004-2008 (<http://www.fs.fed.us/plan>). However, these alternatives address only those decisions that Forest Plans appropriately make (36 CFR Part 219), as described in Chapter 1; all other types of decisions are beyond the scope of the Forest Plan.

The Plan Revision Interdisciplinary (ID) Team developed a broad range of Forest Plan alternatives to address the significant issues. Seven draft alternatives were presented to the Forest Leadership Team (FLT) in January 2004. After review and discussion, the FLT directed the ID Team to carry forward three of the seven draft alternatives for detailed analysis and to merge two others into one. Two of the seven draft alternatives—the minimum level of management and the maximum production potential—were eliminated from detailed consideration and used only for analysis benchmarks. Another alternative was proposed by a citizen group, and several elements of the proposed alternative were included as elements within the range of alternatives considered in detail.

The FLT determined that four alternatives (plus the 1990 Forest Plan as the No Action Alternative) were sufficient to address the significant issues. Because the needed changes to the Forest Plan are modest, the complexity of the analysis and the number of alternatives required for this FEIS are less than those accompanying the 1986 Forest Plan and the 1990 Forest Plan. The range of alternatives considered in detail in this FEIS reflects the relatively modest need for change and the nature of the significant issues identified.

Direction Common to All Alternatives

A forest plan, like all National Forest management activity, must conform to established public policy expressed in Federal statutes, regulations, and administrative directives as well as applicable state laws and regulations. These themes are common to each alternative developed for Forest Plan revision. Each alternative considered in detail:

- Strives to strike a balance among the multiple uses that citizens have for their public lands and the many values they represent
- Maintains or enhances the diversity and quality of habitats needed to ensure the viability of all native plant and animal species that reside on or have important breeding habitat within the Ouachita National Forest (including all species listed as Threatened and Endangered that occur on the Forest)
- Provides for meeting or exceeding the guidelines presented by the Arkansas and Oklahoma Best Management Practices (BMPs) manuals for limiting pollution from non-point sources
- Directs that prescribed burns comply with state smoke management plans
- Protects significant heritage resources (historic and pre-historic)
- Identifies 55 to 57 percent of National Forest land as suitable for some form of timber production, said production to be guided by ecosystem management objectives
- Recommends that the Glover River be considered for designation as a Wild and Scenic River
- The four action alternatives also would treat cross-country motorized vehicle travel as unsuitable, with one exception for game retrieval in Alternative D

Management Setting Common to All Alternatives

All alternatives analyzed in detail in Chapter 3 considered ongoing resource management projects, permits, contracts, and other instruments for the use and occupancy as pre-existing actions. These “pre-existing actions” were considered part of the baseline in developing each alternative and were further included in analyzing effects in this FEIS and also as baseline for the Biological Assessment. The projected effects of these actions are part of the cumulative effects analyses documented in the FEIS and Biological Assessment for the Revised Forest Plan. Continued implementation of these pre-existing actions will not foreclose the ability to adopt any of the alternatives analyzed in detail in Chapter 3.

Major resource management projects that included timber harvest activities and may still have harvest activities incomplete are identified by name in Appendix B in Table B.46. Most of those projects also include other resource activities such as wildlife habitat improvements, timber stand improvements, site preparation activities, and prescribed burning which may not be fully implemented before the Revised Forest Plan goes into effect.

Other major resource management projects that contain *completed* timber harvest activities and may still have associated resource activities yet to be implemented. Several non-timber related projects may also have some activities not yet completed. All of these are identified by name in Appendix B in Table B.47, and B.48.

Consistency with the Renewable Resources Planning Act

National Forest Management Act regulations at 36 CFR 219.12(f)(6) direct that forest plans respond to and incorporate national program objectives developed in response to the Renewable Resource Planning Act (RPA). The last RPA Program was developed in 1995. The Government Performance and Results Act (GPRA) replaced the RPA Program. Currently, the Forest Service Strategic Plan (2004 Revision) provides national goals and objectives for the agency as required by the GPRA. The alternatives presented in this FEIS respond to these broad, strategic objectives.

Neither the current RPA Assessment nor the Forest Service Strategic Plan contain recommended output levels applicable to individual national forests. The Assessment does present national and regional analyses of the renewable resource situation, including projections of supply and demand for renewable resources. The Strategic Plan contains goals, objectives, outcomes, performance measures, and strategies that apply to all agency programs, including management of the National Forest System.

Alternatives Considered but Eliminated from Detailed Analysis

Possible alternative themes were outlined in the Notice of Intent published in the Federal Register in May 2002. These themes illustrated the range of alternatives that might be considered. The themes were modified based upon public comments. The current analysis focused on the question, “What components of existing management direction (Alternative A) need to change?” In that context, several possible alternatives, including the “minimum level of management” or “minimum amount of human management/maximum amount of natural forces” were outside the scope of the analysis because such alternatives would not have enabled the Forest Service to meet minimum management requirements for sustaining habitat for all native species and forest health. “Maximum timber production” was not considered an alternative to be analyzed in detail because it would have been inconsistent with the requirements for providing for multiple uses and would not meet the minimum management requirements for sustaining habitat for all native species.

The ID team also considered an alternative presented by the Sierra Club for the revised plans of the Ouachita and Ozark-St. Francis National Forests. The full text of the Sierra Club proposal is included in the administrative record with a more detailed rationale for not considering this alternative in detail. Some elements of the proposal were included in some alternatives; other elements either were beyond the scope of plan revision or were too vague. Brief responses to each point in the nine-point Sierra Club proposal follow:

- Wild and Scenic Rivers—all rivers eligible or already recommended for designation as National Wild and Scenic Rivers would remain so and would be protected within a Wild and Scenic River Corridor Management Area under all alternatives. The Forest Service does not have the authority to formally designate rivers as National Wild and Scenic Rivers, making it impossible to include this element of the Sierra Club alternative.
- Wilderness—RARE II areas and additions to existing wilderness were evaluated for all alternatives; however, merely conducting such an evaluation is not a logical part of a plan alternative.
- Large Conservation Areas (no logging or road construction on areas of up to 500,000 acres)—All alternatives treat more than 40 percent of the National Forest as unsuitable for timber production. Forty-three percent (732,590 acres) of the Ouachita National Forest is treated as unsuitable for timber production in the Selected Alternative. Substantial portions of the “unsuitable” land base occur in large blocks, and many of these areas will have not have roads constructed within them. The Sierra Club proposal itself (“areas of up to 500,000 acres”) is too vague to be considered part of an alternative considered in detail.
- Recreation—“emphasize recreation” is too vague to be considered part of an alternative considered in detail.
- Off-Highway Vehicles—the portion of this proposal having to do with treating cross-country travel by such vehicles as unsuitable has been incorporated in the action alternatives.
- Fire—the FEIS addresses the effects of prescribed fire.
- Natural Biodiversity—all timber and wildlife management activities conducted under the 1990 Forest Plan already “ensure that the native biodiversity of the [Ouachita National Forest] will be maintained and/or reestablished,” and this will not change, regardless of alternative.
- Forest Pests—the term “documented natural biodiversity” is vague, and this element could not be incorporated in any alternative. Provisions to minimize forest pest infestations; however, are included in all alternatives.
- Free Flowing Streams—a provision to discourage impoundments of free-flowing streams on National Forest System lands is included in the action alternatives.

During the 90-day comment period, a timber company owner suggested that the Forest Service develop a new alternative that would “consider the positive environmental health on air, water, soil, wildlife, trails, roads, healthy industries, positive economics and recreation purposes without any constraints placed on budgets, manpower or supervisor’s direction.” This alternative was not examined in detail because it contained too many parameters to incorporate into a reasonable alternative. Furthermore, alternatives unconstrained by budgets or manpower are inherently unreasonable, particularly in an environment where budgets and manpower are steadily declining. However, the parameters noted by the commenter were certainly taken into consideration in making the final selection of an alternative.

Alternatives Analyzed in Detail

Five alternatives were analyzed in detail. See Appendix B for a detailed description of the mathematical model (SPECTRUM) and socio-economic analysis used. Acreage allotted to management area varies little among alternatives. The range of alternatives considered in detail in

this FEIS appropriately reflects the relatively modest need for change and the nature of the significant issues identified. Nonetheless, substantial variation exists among alternatives in terms of projected management activities (e.g., prescribed burning, application of uneven-aged management, thinning acres), acres in the high SPB risk category, acres recommended for wilderness designation, acres in Fire Regime Condition Class 1 or 2, projected annual net revenue for the planning period, population response by terrestrial management indicator species, species viability scores, and OHV use direction. Each action alternative allocates lands and waters to the same set of management areas and, in almost every case, allocates the same lands to the same management areas (wilderness recommendations account for any differences). Alternative A (No Action Alternative) represents a continuation of the 1990 Forest Plan, as further amended. Alternative E was identified in the DEIS and is the agency's Selected Alternative for the 2005 Revised Forest Plan.

Management Areas

Management Areas (MA) for the Ouachita National Forest are geographically defined areas with unique characteristics, different desired conditions, and specific standards to guide project planning and implementation that supplement the forest-wide standards. In all alternatives except A (No Action Alternative), a slightly revised set of MAs and descriptions is used. The MAs for Alternative A are the same as the 1990 Forest Plan. Table 2.1 compares the MAs for the 1990 Forest Plan (Alternative A) to those used in the other alternatives.

Table 2.1 Management Areas for 1990 Plan Compared to Other Alternatives

Management Areas (MAs) for Alternatives B, C, D, and E	Management Areas (MAs) for Alternative A (1990 Forest Plan)
MA 1: Wilderness (1a); Poteau Mountain (1b), Recommended Wilderness Addition (1c)	MA 1: Wilderness; MA 1a: Poteau Mountain
MA 2: Special Interest Areas: Scenic Areas (2a); Watchable Wildlife Areas (2b); Rich Mountain and South Fourche Botanical Areas (2c); Rich Mountain Recreation Area (2d)	MA 2: Scenic Areas
MA 3: Developed Recreation Areas	MA 3: Recreation Sites
MA 4: Research Natural Areas and National Natural Landmarks	MA 4: Research Natural Areas and National Natural Landmarks
MA 5: Experimental Forests	MA 5: Alum Creek and Crossett Experimental Forest
MA 6: Rare Upland Communities	MA 6: Threatened, Endangered or Sensitive Species Habitat
MA 7: Ouachita Seed Orchard	MA 7: Ouachita Seed Orchard
MA 8: Administrative Sites/Special Uses	MA 8: Administrative Sites
MA 9: Water and Riparian Communities	MA 9: Water and Riparian Areas
MA 10: Reserved	MA 10: Non-Forest
MA 11: Reserved	MA 11: Not Appropriate for Timber Production
MA 12: Reserved	MA 12: Unproductive
MA 13: Reserved	MA 13: Ouachita Mountains, Unsuitable Lands Based on Other Resource Coordination
MA 14: Ouachita Mountains, Habitat Diversity Emphasis	MA 14: Ouachita Mountains, Lands Suitable for Timber Production
MA 15: West Gulf Coastal Plain, Habitat Diversity Emphasis	MA 15: Coastal Plain
MA 16: Lands Surrounding Lake Ouachita and Broken Bow Lake	MA 16: Lake Ouachita
MA 17: Semi Primitive	MA 17: Semi-Primitive Motorized
MA 18: Reserved (scenery management addressed Forest-wide)	MA 18: Visually Sensitive Foreground Areas, Roads And Trails
MA 19: Winding Stair Mountain National Recreation Area (and Associated Non-Wilderness Designations)	MA 19: Winding Stair Mountain National Recreation and Wilderness Area (OK) and Rich Mountain Recreation and Black Fork Wilderness Area (AR)
MA 20: Wild and Scenic River Corridors	MA 20: Wild and Scenic River Corridors
MA 21: Old Growth Restoration	MA 21: Old Growth Restoration
MA 22: Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat	MA 22: Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem And Red-cockaded Woodpecker Habitat
MA 23: Reserved – Broken Bow Lake MA was incorporated with Lake Ouachita MA in MA 16	MA 23: Broken Bow Lake (NF lands above)

Alternative A

Alternative A (1990 Amended Plan) would make no changes in management direction in the 1990 Amended Forest Plan, as amended through 2005. Management Areas (MAs), projected resource management actions, and all other Plan components would remain unchanged. The 1990 Forest Plan, as amended, would continue to be implemented. This alternative is the No Action Alternative and serves as a baseline to which the other alternatives are compared.

Ecosystem Health and Sustainability: Current ecosystem management priorities and emphasis would continue. The present emphasis on pine-oak community health and health in communities susceptible to oak decline and other threats to oak-dominated ecosystems would be maintained. These communities would continue to be susceptible to oak decline and southern pine beetle outbreaks. Prescribed burning would treat an average of 68,000 acres per year.

Land Allocation: Current land allocations to MAs would be maintained. No new wilderness recommendations would be made. Lands classed as suitable for timber production would equal 1,019,694 acres.

Public Access and Recreation: Current standards for public access and recreation opportunities would be retained. The Visual Quality Objective system would be retained for visual resource management.

Relationship to Communities: The Forest would continue to seek to improve economic and other relationships with nearby communities.

Alternative B

Alternative B would make no major adjustments to management direction in the 1990 Amended Forest Plan, as amended through 2005. Changes would be limited to those needed to comply with pertinent changes in law and policy; update projections for acres of prescribed burning, thinning, and regeneration harvests; adjust the Forest Plan to the new model format; make cross-country travel by motorized vehicle unsuitable; and remove obsolete or unnecessary direction. Compared to the 1990 Forest Plan (Alternative A), this alternative would feature a slightly increased emphasis on ecosystem health and sustainability objectives, including program adjustments to respond to the Healthy Forest Initiative and the 2004 revision of the Agency's Strategic Plan.

Ecosystem Health and Sustainability: Current ecosystem management priorities would continue, augmented by a small increase in emphasis on ecosystem health in systems susceptible to oak decline or catastrophic wildland fire. Prescribed fire acres would increase from 68,000 average annual acres to approximately 125,000 average annual acres.

Land Allocation: Streamside Management Areas would be maintained, with limited vegetative management to meet ecosystem health objectives allowed. Lands classed as suitable for timber production would equal 1,019,694 acres.

Public Access and Recreation: Cross-country travel by motorized vehicles would not be suitable. The Visual Quality Objective system would be retained for visual resource management.

Relationship to Communities: The Forest would continue to seek to improve economic relationships with communities and to seek other opportunities for coordination, including addressing impacts and opportunities represented by the Healthy Forest Initiative.

Alternative C

Alternative C would place the most emphasis on active management for ecosystem health. Management activities would focus on restoring and maintaining native pine-grass, oak woodland, and other fire and disturbance dependant ecosystems. Activities such as prescribed burning and thinning would be more intensive than the other alternatives. Compared to the 1990 Amended Forest Plan (Alternative A), this alternative would place greater emphasis on actively managing for improved ecosystem health and sustainability. These objectives would be achieved by aggressively restoring and maintaining native pine-grass, oak woodland, and other fire-adapted ecosystems.

Ecosystem Health and Sustainability: Vegetation management would emphasize restoration and maintenance of lower density, insect outbreak and disease-resistant forest and woodland ecosystems. Tools for improving forest health, particularly areas at risk of disease, pest, and/or invasive species infestation (southern pine beetle, oak decline, non-native invasive plants) would include a mix of silvicultural techniques, prescribed fire, and minimal pesticide use. Activities such as prescribed burning and thinning would be more intensive than the other alternatives especially within pine-oak and some hardwood-dominated communities. Prescribed fire acres would increase from 68,000 average annual acres to approximately 250,000 average annual acres. Acres estimated to be susceptible to southern pine beetle infestation would decline from 272,000 to 66,000.

Land Allocation: Three additions to existing wildernesses would be recommended: 620 acres to the Flatside Wilderness in Arkansas, 77 acres to the East Unit of Poteau Mountain Wilderness in Arkansas, and 1,096 acres to the Upper Kiamichi Wilderness in Oklahoma. Streamside Management Areas would be maintained, with limited vegetative management to meet ecosystem health objectives allowed. Lands classed as suitable for timber production would equal 1,017,901 acres.

Public Access and Recreation: Open road density objectives would be modified to reflect a more realistic approach than the 1990 Forest Plan to areas that have a high density of non-National Forest System roads. Other access would be as in the 1990 Forest Plan, except that cross-country motorized access would not be suitable, and the Forest would move, within the next four years, to a system of designated routes. The Scenery Management System (SMS) would be implemented, with greater emphasis placed in heavily used traffic corridors and lakes.

Relationship to Communities: This alternative would produce more timber, reduce fuels in the wildland-urban interface, and produce more smoke related short-term impacts. The Forest would continue to seek to improve economic relationships with communities and to seek other opportunities for coordination, including addressing opportunities represented in the Healthy Forest Initiative.

Alternative D

Compared to the 1990 Forest Plan (Alternative A), this alternative would maintain or make modest changes in projections for most forms of forest management, with increases in prescribed burning and thinning in MA 21-Old Growth Restoration (Pine-Grass Emphasis) and 22-Renewal of the Shortleaf Pine-Bluestem Ecosystem and Red-Cockaded Woodpecker Habitat, walk-in turkey hunting areas, and cooperative wildlife management areas. This alternative would not thin as many acres as Alternatives C or E. More emphasis would be placed on scenery enhancement in vistas along travel corridors and areas adjacent to lakes. Program adjustments would be made to reflect the Healthy Forest Initiative, including addressing fuel levels near communities at risk.

Ecosystem Health and Sustainability: Vegetation management would emphasize attaining minimum levels of habitat needed for species viability. "Watchable wildlife," including important birding areas, would be promoted. Restoration of native pine-grass and oak woodland ecosystems would be expanded in support of wildlife management objectives in walk-in turkey areas and wildlife management areas to support hunting-based recreation. Prescribed fire acres would increase from 68,000 average annual acres to approximately 100,000 average annual acres. Acres estimated to be susceptible to southern pine beetle infestation would decline from 272,000 to 90,000.

Land Allocation: New recommended wilderness areas in Arkansas would include Brush Heap, Blue Mountain, and Irons Fork. Additions to Flatside Wilderness, Upper Kiamichi Wilderness, and an addition to the East Unit of Poteau Mountain Wilderness in Arkansas would also be recommended. Streamside Management Areas would be maintained with limited vegetative management to meet ecosystem health objectives allowed. Lands classed as suitable for timber production would equal 989,567 acres.

Public Access and Recreation: Open road density objectives would be modified to reflect a more realistic approach to areas that have a high density of non-National Forest System roads. Cross-country motorized vehicle access would not be suitable, except for cross-country travel for retrieval of big game. The Scenery Management System (SMS) would be implemented, with greater emphasis placed in heavily used traffic corridors and lakes. Vegetation management would promote "watchable wildlife," in appropriate areas including important birding areas.

Relationship to Communities: This alternative would produce a slight increase in positive economic impacts related to recreation and tourism and a slight decrease in positive impacts related to timber harvesting. The Forest would continue to seek to improve economic relationships with communities and to seek other opportunities for coordination, including opportunities presented by the Healthy Forest Initiative.

Alternative E

Compared to Alternatives A, B, and D, this alternative would place greater emphasis on actively managing for improved ecosystem health and sustainability. These objectives would be achieved by increasing the rate of restoration and maintenance of fire-adapted systems such as native pine-grass and oak woodland communities, but not at the rates or intensity proposed under Alternative C

Ecosystem Health and Sustainability: Prescribed fire acres would increase from 68,000 average annual acres to approximately 180,000 average annual acres. Major ecological systems and rare upland communities would receive increased management to enhance ecosystem health and species viability. Acres estimated to be susceptible to southern pine beetle infestation would decline from 272,000 to 63,000.

Land Allocation: Three additions to existing wildernesses would be recommended: 620 acres to the Flatside Wilderness in Arkansas, 77 acres to the East Unit of Poteau Mountain Wilderness in Arkansas, and 1,096 acres to the Upper Kiamichi Wilderness in Oklahoma. Streamside Management Areas would be maintained with limited vegetative management to meet ecosystem health objectives allowed. Lands classed as suitable for timber production would equal 1,016,228 acres.

Public Access and Recreation: Open road density objectives would be modified to reflect a more realistic approach to areas that have a high density of non-National Forest System roads. Cross-country access by motorized vehicles would be unsuitable. The Scenery Management System (SMS) would be implemented, with greater emphasis placed in heavily used traffic corridors and lakes. Management for scenic integrity may affect prescribed fire locations. Other vegetation management would be visually mitigated. Vegetation management would promote "watchable wildlife," in appropriate areas including important birding areas.

Relationship to Communities: This alternative would produce more timber, reduce fuels in the wildland-urban interface, and produce more smoke related short-term impacts, but less than Alternative C. The Forest would continue to seek to improve economic relationships with communities and to seek other opportunities for coordination, including opportunities presented by the Healthy Forest Initiative.

The remaining tables in this chapter provide summary comparisons of alternatives using various measures.

Table 2.2 Summary Comparison of Alternatives

Response Measure	Alternative				
	A No Action	B	C	D	E Selected
Acres in Fire Regime 1, Condition Class 1 or 2, 1st 10-Year Period	266,000	122,000	535,000	283,000	291,000
Acres in southern pine beetle Risk Category 1, 1st 10-Year Period	272,000	275,000	66,000	90,000	63,000
Acres of hardwood forest in high risk categories, 1st 10-Year Period	91,000	91,000	7,000	91,000	84,000
Acres Suitable for Timber Production	1,019,694	1,019,694	1,017,901	989,567	1,016,228
Acres designated/recommended as wilderness	64,469	64,469	66,262	94,596	66,262
Acres in Management Area 9, Water and Riparian	278,284	278,284	278,284	278,284	278,284
Uneven-aged management emphasis (total area in acres)	250,000	110,000	100,000	200,000	125,000
Projected average annual thinning acres, 1st 10-Year Period	26,226	17,400	51,700	27,700	28,500
Prescribed fire (projected total average annual acres)	68,000	125,000	250,000	100,000	180,000
Acres of mast producing hardwood	297.5	297.5	297.5	297.5	297.5
Allowable Sale Quantity (MMCF), Average Annual	26.2	26.2	33.0	25.0	27.0
Employment Average Annual 1st 10-year period	3,894	3,796	3,941	3,842	3,898
Labor Income (\$ million)	107.2	103.8	109.4	105.5	107.6
Annual Budget (\$ Million)	22.7	22.8	23.7	22.9	23.1
Annual Net Revenue (x 1\$ Million) 1st 10-Year Period	6.0	6.5	1.8	5.5	6.8
Long-Term Sustained Yield (MMCF)	50.0	57.8	73.7	63.2	69.3

Table 2.3 Terrestrial Habitat Capability (Animals per Square Mile) for MIS by Alternative after 10 Years and 50 Years of Forest Plan Implementation

		Scarlet Tanager		Prairie Warbler		Pileated Woodpecker		Eastern Wild Turkey		Northern Bobwhite		White-tailed Deer	
		10 yr	50 yr	10 yr	50 yr	10 yr	50 yr	10 yr	50 yr	10 yr	50 yr	10 yr	50 yr
Alternative	A	24.9	27.1	39.2	49.8	18.6	26.0	3.4	3.7	35.2	56.7	12.8	16.7
	B	25.2	27.5	30.9	51.4	18.7	26.7	2.7	3.1	29.1	54.3	13.2	18.3
	C	24.1	25.7	72.4	99.9	14.3	18.5	5.9	7.0	42.7	77.5	22.7	30.0
	D	24.9	26.8	40.1	65.9	17.8	23.8	3.2	3.4	37.8	69.2	13.4	19.9
	E	25.0	27.3	40.5	59.4	17.8	25.3	3.3	3.9	36.6	70.0	13.7	20.2

Comparison of Alternatives by Issue

Ecosystem health and sustainability is one of the major, broad issues identified for this Revised Forest Plan. Without a healthy and sustainable forest, most other opportunities and resource values that are forest-dependent, such as recreational opportunity, wildlife, timber harvest, and clean water would be jeopardized or in marked decline. Table 2.4 includes indicators used to measure forest health and sustainability by alternative: number of species with viability scores of “good” to “very good”; acres in Fire Regime 1, Condition Class 1 or 2; acres at risk for southern pine beetle outbreaks, and acres of hardwood in high-risk categories. Alternative C has the highest number of species with viability scores of “good” to “very good,” closely followed by Alternative E. Due to its more aggressive treatment regime, Alternative C would have the most acres in Fire Regime 1, Condition Class 1 or 2 and the fewest hardwood acres rated as “high risk.” Alternatives C and E have the fewest acres projected to be susceptible to southern pine beetle infestation. Considering all factors, Alternative C could be considered the “maximum health” alternative.

Table 2.4 Issue Category: Ecosystem Health and Sustainability

Issue Measure	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Species Viability (numbers of species in good to very good condition of 80 species forest-wide)	27	42	59	39	53
Acres in Fire Regime 1, Condition Class 1 or 2, 1st 10-Year Period	266,000	122,000	535,000	283,000	291,000
Acres in southern pine beetle Risk Category 1, 1st 10-Year Period	272,000	275,000	66,000	90,000	63,000
Acres of Hardwood Forest in High Risk Categories 1st 10-Year Period	91,000	91,000	7,000	91,000	84,000

Measures used to address land use designation issues and describe the allocations of National Forest System lands are shown in Table 2.5 and include: acres of existing and recommended wilderness, water and riparian areas (MA 9), and acres suitable for timber production. Alternative D recommends the addition of the most acres for wilderness (approximately 30,100 acres). All alternatives maintain nearly equal protections for water and riparian areas and assign the same acreage to Management Area 9. Acres suitable for timber production also remain fairly constant, although the wilderness recommendations cause minor decreases in Alternatives C and E and by reduction of acres suitable for timber production, reflect the larger wilderness recommendation of Alternative D.

Table 2.5 Issue Category: Land Use Designations

Issue Measure	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Acres of Wilderness and Recommended Wilderness	64,469	64,469	66,262	94,596	66,262
Acres in Management Area 9, Water and Riparian	278,284	278,284	278,284	278,284	278,284
Acres Suitable for Timber Production	1,019,694	1,019,694	1,017,901	989,567	1,016,228

The issue of public access and recreational activities is addressed in Table 2.6, with measures to reflect changes in the transportation system, OHV use, quality of non-motorized opportunities, and number of deer, turkey, and quail per square mile. Road density is a key factor in measuring disturbance to wildlife. Under Alternatives C, D, and E, road density standards would be imposed that clarify how the Forest would undertake to limit open road density for wildlife purposes. Under Alternatives B, C, D, and E, cross-country travel by motorized vehicles would not be suitable, while under Alternative A, such travel would remain suitable. Under the action alternatives, where OHV and other motorized vehicle use would be projected to move from cross-country travel to designated routes within four years, the quality of non-motorized opportunities should increase, because noise interference by vehicles would be reduced. As hunting is a recreational activity, number of game species is an important measure. Because it is the alternative with the most intensive management, Alternative C, has the highest projected density of game animals (deer, turkey, and Northern bobwhite).

Table 2.6 Issue Category: Public Access and Recreational Activities

Issue Measure	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Transportation System	Current	Current	New road density objective	New road density objective	New road density objective
Off Highway Vehicle Use (for cross-country travel)	Suitable	Unsuitable	Unsuitable	Unsuitable (except for large game retrieval)	Unsuitable
Quality of non-motorized opportunities	Current	Higher	Higher	Higher	Higher
Deer per square mile	12.8	13.2	22.7	13.4	13.7
Northern bobwhite per square mile	35.2	29.1	42.7	37.8	36.6
Eastern Wild Turkey per square mile	3.4	2.7	5.9	3.2	3.3

Table 2.7 provides some measures that compare the relationship of the Forest to communities. Measures include the projected timber harvest volume and the economic values associated with timber harvest. All measures are reported for the first ten years of Forest Plan implementation and assume, for comparative purposes, that timber sales equal the allowable sale quantity. Although timber harvest volume would be greatest under Alternative C, when costs are deducted, the alternative with the greatest net revenue would be Alternative E. Average annual employment and labor income from that employment would be greatest under Alternative C, followed closely by Alternatives A, D, and E.

Table 2.7 Issue Category: Relationship of the National Forest to Communities

Issue Measure	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Allowable Sale Quantity (MMCF) 1 st 10-year Period	261.8	261.8	330.0	250.0	270.0
Annual Net Revenue (\$ Million) 1 st 10-Year Period	6.0	6.5	1.8	5.5	6.8
Employment Avg. Annual 1 st 10-year Period	3,894	3,796	3,941	3,842	3,898
Annual Labor Income (\$ Million)	107.2	103.8	109.4	105.5	107.6

Chapter 3—Affected Environment and Environmental Consequences

Introduction

This chapter describes the existing environment of the Ouachita National Forest and provides a more detailed scientific and analytic basis for comparing the alternatives than Chapter 2, which summarizes the differences among alternatives. Each section begins with a brief description of the affected environment and concludes by disclosing the projected direct, indirect, and cumulative effects (the environmental consequences) of implementing the various alternatives. Direct environmental effects are those that occur at the same time and place as the initial action. Indirect effects are those that occur later than the action or are spatially removed from the activity. Cumulative effects are those that result from the incremental effects of actions (or inaction) over time.

Ecological Setting

The Forest Service adopted a “national hierarchical framework of ecological units” in the mid-1990s. Cleland and others (1997) note that the primary purpose for delineating ecological units is “to identify land and water areas at different levels of resolution that have similar capabilities and potentials for management.” Ecological units exhibit similar patterns in: (1) natural communities, (2) soils, (3) hydrologic functions, (4) landforms and topography, (5) lithology, (6) climate, and (7) natural processes, including nutrient cycling, productivity, succession, and disturbance regimes associated with flooding, wind, fire, and other natural forces. The Forest Service classification system is summarized in Table 3.1.

Table 3.1 Forest Service National Hierarchy of Ecological Units

Planning and Analysis Scale	Ecological Unit	Purpose, Objective, and General Use	General Size Range
Ecoregion Global Continental Regional	Domain Division Province	Broad application for modeling and sampling strategic planning and assessment	Tens of thousands to millions of square miles
Subregion	Section Subsection	Strategic, multi-forest statewide, and multi-agency analysis and assessment	Thousands to tens of thousands of square miles
Landscape	Landtype Association	Forest area wide planning and watershed analysis	Thousands to tens of thousands of acres
Land Unit	Landtype Landtype Phase	Project and management area planning and analysis	Ten acres or less to hundreds of acres

Source: Cleland and others (1997)

The Ouachita National Forest lies within the Subtropical Division of the Humid Temperate Domain. Most of the Forest is within the Ouachita Mountains Section of the Ouachita Mixed Forest-Meadow Province. Relatively small portions of the Forest to the north and south of the Ouachita Mountains lie within the Southern Mixed Forest Province, which includes small portions of the Middle Coastal Plains Western Section and the Arkansas Valley Section. The Ouachita National Forest occupies portions of seven ecological subsections. At the landscape level, probably the most relevant for forest planning, the Ouachita National Forest has identified 22 Landtype Associations (LTAs) within the seven subsections. These ecological units were differentiated on the basis of landform, geology, soils, and natural vegetation. For maps of the subsections and LTAs, see <http://www.fs.fed.us/r8/ouachita>. Brief descriptions of the subsections follow this tabulation of the LTAs on the Ouachita National Forest and the subsections within which they occur:

Subsection	Landtype Association (LTA)
Western Arkansas Valley Mountains:	McAlester/Savanna Mtns. Poteau River Valley
Fourche Mountains:	Dutch Creek Mtns Fourche Valley Lower Jackfork Mtns. Black Fork/Rich Mtns. Johns Valley Long Fourche Mtns Muddy/Blue Mtns. Kiamichi/Ouachita River Valley
Western Ouachita Mountains:	Kiamichi Mtns. Hee Mtn. Mountain Fork/Glover Valley
Central Ouachita Mountains:	Crystal Mtns. Mazarn Valley Ordivician Hills Novaculite/Chert Mtns Broken Bow
Athens Piedmont Plateau:	Cossatot Valley
Southwestern Arkansas:	Little River Tiak
Red River Alluvial Plain:	Red River Valley

The Western Arkansas Valley Mountains subsection is in Arkansas and Oklahoma. The McAlester/Savanna Mountains and Poteau River Valley, consisting of low mountains and ridges interspersed with narrow to wide valleys, are the only two LTAs delineated within the Forest boundary. Elevations range from 500 feet above sea level in the valleys to 2,800 feet on some of the highest peaks. The dominant geologic formations are Pennsylvanian, including Upper and Middle Atoka sandstone. The vegetation is predominately shortleaf pine-oak forest and woodland.

The Fourche Mountains subsection is located in Arkansas and Oklahoma. There are eight LTAs within this subsection. Topography ranges from rolling hills to high elevation mountains (relative to the Ouachitas as a whole) aligned in an east-west orientation interspersed with broad valleys.

Elevations range from 400 feet above sea level in the valleys to 2,600 feet on Rich and Black Fork Mountains. Geologic substrates are predominately Mississippian and Pennsylvanian shale and sandstone. The dominant vegetation is pine-oak forest and woodlands. There are several distinct plant communities within the Fourche Mountains subsection including sugar maple-oak-hickory forest, stunted white oak woodlands, and sandstone glades.

The Western Ouachita Mountains subsection, consisting of high to mid-elevation mountains with wide valleys, is located in western Arkansas and eastern Oklahoma. There are three LTAs within this subsection. This area has east-west trending ridges with very steep to moderately steep north-facing slopes and moderately sloping south-facing slopes. The elevation ranges from 400 feet in the valleys to 2,300 feet above sea level in the mountains. Geologic substrates are predominately Jackfork sandstone and Stanley shale. The mountains and hills are dominated by pine-oak forest and woodland, with some prairies in the valleys. Some of the unique plant communities scattered throughout this subsection include mesic oak-hickory forest (with sugar maple, basswood, red oak, white oak, and hickories) on the steep north-facing slopes and seeps and springs in draws.

The Central Ouachita Mountains subsection is characterized by mid-elevation mountains and hills aligned principally in an east-west orientation, interspersed within broad, narrow valley bottoms with elevations ranging from 600 to 1,700 feet above sea level. Five LTAs lie within this subsection. This part of the Ouachita Mountains is the richest in terms of plant community diversity. Natural communities include many seeps and springs, some of the most mesic (moist) forests found on the Ouachita National Forest (highlighted by stands of American beech and umbrella magnolia in coves, on north-facing slopes, and on stream terraces), and novaculite, shale, and sandstone glades and rock outcrops.

A very small portion of the Ouachita National Forest lies within the Athens Piedmont Plateau subsection, and the Cossatot Valley is the only LTA delineated within in the Forest boundary on the Athens Piedmont Plateau subsection. The topography of the Cossatot Valley consists of gently undulating to strongly sloping hills interspersed with long, narrow valleys aligned somewhat in an east-west trending direction. The elevations range from about 500 feet above sea level to about 1,100 feet. The main geologic formation is Mississippian-age Stanley Shale. The vegetation consists of loblolly-shortleaf-oak forest on gentle slopes and shortleaf pine-oak and oak hickory forest on steeper slopes.

Within the Southwestern Arkansas subsection (which includes part of southeastern Oklahoma), the Little River and Tiak are the only LTAs located within the Ouachita National Forest. Most of the land within these LTAs is privately owned. The area within the Forest boundary area is situated on very broad, nearly level to gently undulating upland flats and terraces and low rolling hills. The elevation ranges from 300 to 500 feet above sea level. The predominant geologic formation is the Cretaceous Woodbine formation, made up of quartzose sand, clay, lignites, and some fossil plants. The dominant forest types are loblolly-shortleaf-oak on gentle slope in the uplands, with a few mixed bottomland hardwood forests along floodplains and terraces. The soils are deep and formed mainly from alluvium.

A very small portion of the Red River Alluvial Plain subsection is located on the Tiak Ranger District, and the Red River Valley LTA is the only one delineated within that part of the Forest. The land base within this LTA is mostly privately owned. This LTA is situated on very broad, nearly level upland flats and terraces with localized inclusions of gently to moderately sloping low hills. The geologic substrate consists mainly of Quaternary alluvial surface deposits. The dominant vegetation within the Forest boundary includes loblolly and shortleaf pine mixed with oaks in the uplands and mixed bottomland hardwood forests along floodplains and terraces.

Climate

The climate of the Ouachita National Forest in Arkansas and Oklahoma is temperate due to a central location in the North American continent. Air masses that move across the Forest generally originate from the Eastern Pacific Ocean, Western United States, the Gulf of Mexico, and Canada. The sources of moisture for the region are the Pacific Ocean and the Gulf of Mexico. Because of atmospheric circulation patterns, weather systems generally move from west to east across the Ouachita Mountains (USDA Forest Service 1999a).

Maximum mean monthly temperatures range from 49°F in January to 93°F in July for the northwestern area of the Forest (Fort Smith, AR) and from 51.5°F in January to 93.5°F in July for the southeastern areas of the Forest (Hot Springs, AR). Minimum mean monthly temperatures range from 29.1°F in January to 71.2°F in July for Fort Smith, AR, and from 31°F in January to 70.6°F in July for Hot Springs, AR.

Mean annual precipitation ranges from 39.4 inches per year in Fort Smith, AR, to 55.5 inches per year in Hot Springs, AR. Corresponding surface runoff values range from 14 to 22 inches per year. A comprehensive discussion of monthly maximum, minimum, and extreme temperatures; monthly maximum, minimum, and extreme precipitation events; surface runoff; droughts; and tornados is found in the Ozark-Ouachita Highlands Assessment, Aquatic Conditions report (USDA Forest Service 1999a).

Direct, Indirect, and Cumulative Effects

Many scientists believe that increasing concentrations of atmospheric carbon are producing long-term climate changes. Global climatic change has the potential to influence the resources of the Forest and in turn affect the species dependent upon the Forest for habitat. It is believed that vegetation growth and the associated storage of carbon in living and dead wood fiber associated with forests helps to remove carbon from the atmosphere. Over the long-term, climate changes also affect the duration, frequency, and intensity of forest disturbances such as fire, insects, disease, drought, and storms (USDA Forest Service Strategic Plan for Fiscal Years 2004-2008). Until research to assess the impacts of climate change on the health and productivity of forest ecosystems is complete, impacts on climatic change and variability will remain undetermined.

Air Quality

Federal land management agencies have the unique responsibility to protect the air, land, and water under their respective authorities from degradation associated with air pollution emitted outside the borders of agency lands (Clean Air Act, as amended 1990), as well as from the impacts of air pollutants produced within those borders. These mandates are established through a series of legislative and regulatory requirements (Clean Air Act, as amended 1990; Organic Act 1977, Wilderness Act 1997).

The Clean Air Act (CAA) sets the standards for the air quality in the United States. The CAA has numerous sections, and among these, two are particularly important to National Forest System (NFS) management: National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD). The entire country must comply with the air quality standards set by NAAQS for six criteria pollutants. Primary NAAQS are set based on human health criteria. State air quality regulatory agencies establish State Implementation Plans (SIPs) to ensure that these standards are met in their respective states. If the standards are not met for any criteria pollutant, the area is designated as non-attainment for the pollutant. It is the responsibility of the Ouachita National

Forest to ensure that management activities do not significantly contribute to a violation of the NAAQS.

The Clean Air Act Amendments of 1977 established the Prevention of Significant Deterioration (PSD) program. These amendments designated specific Class 1 areas, and the Forest manages one Class 1 area, Caney Creek Wilderness. There is another Class 1 area in Arkansas, the Upper Buffalo Wilderness, managed by the Ozark-St. Francis National Forests. The PSD regulations require the “affirmative responsibility to protect the air quality related values (including visibility) of any such [wilderness or national park] lands,” and to consider “whether a proposed source or modification would have an adverse impact on such values” (40 CFR 51.166 (p)(2)). Because of this responsibility, the status of air quality in and near the Class 1 areas, as well as how current levels of air pollution are impacting Air Quality Related Values (AQRVs), must be considered when making impact determinations about new sources of air pollution.

In addition to protecting Class 1 wilderness, all federal lands are to be protected from air quality impacts, regardless of whether those impacts are coming from within agency borders or without. The CAA, as amended in 1990 contains numerous sections dealing with these responsibilities, and Section 101(c) states the primary purpose of the Act:

“A primary goal of this Act is to encourage or otherwise promote reasonable Federal, State, and local governmental actions, consistent with the provisions of this Act, for pollution prevention.”

Beyond the CAA, additional legislation recognizes the importance of air quality and the impact it can have on forest resources. The National Forest Management Act states that Land and Resource Management Plans are, in part, specifically based on:

“...recognition that the National Forests are ecosystems, and their management for goods and services requires an awareness and consideration of the interrelationships among plants, animals, soil, water, air, and other environmental factors within such ecosystems.”

It is within this regulatory framework that resources on NFS lands are to be protected from the detrimental effects of air pollution. Additionally, it is imperative that while federal land managers work to alleviate harmful effects of air pollution from new and existing sources external to Forest boundaries, they must also continue to be good stewards when conducting management activities that contribute to regional air pollution.

Activities such as timber harvesting, oil and gas well drilling and operations, road construction or maintenance, and prescribed fire all produce emissions that may affect air quality in and around the Forest. Although a majority of this area’s pollution comes from sources outside the Forest, activities from within the Forest boundaries can also impact air quality in the region. Within the timeframe of this planning period, however, only prescribed fire is expected to change significantly for all alternatives. Particulate matter (PM) and nitrogen oxide (NOx) emissions from prescribed fire activities will contribute to the total pollution load and are the major pollutants of concern in terms of contributions to NAAQS. Therefore, potential emissions of these pollutants will serve as indicators for air quality effects.

Potential emissions of PM from prescribed fire activities will be evaluated in comparison to total PM emissions in counties near the Forest. Analyses for direct and indirect effects of air pollution are limited to pollution *emitted* from within lands administered by the Forest as a result of management activities. Air pollution must be evaluated in both a regional and cumulative context; and it is imperative that an area larger than just NFS lands is used in an air quality evaluation. Because air pollution disperses, levels of pollution emitted from Forest management activities have been

evaluated considering regional pollution loads and current air quality monitoring data. An analysis area of 50 kilometers was determined to be adequate to describe the area potentially affected by the mobile and area sources of pollution from Forest management activities on regional air quality. Figure 3.1 shows the air quality assessment analysis area.

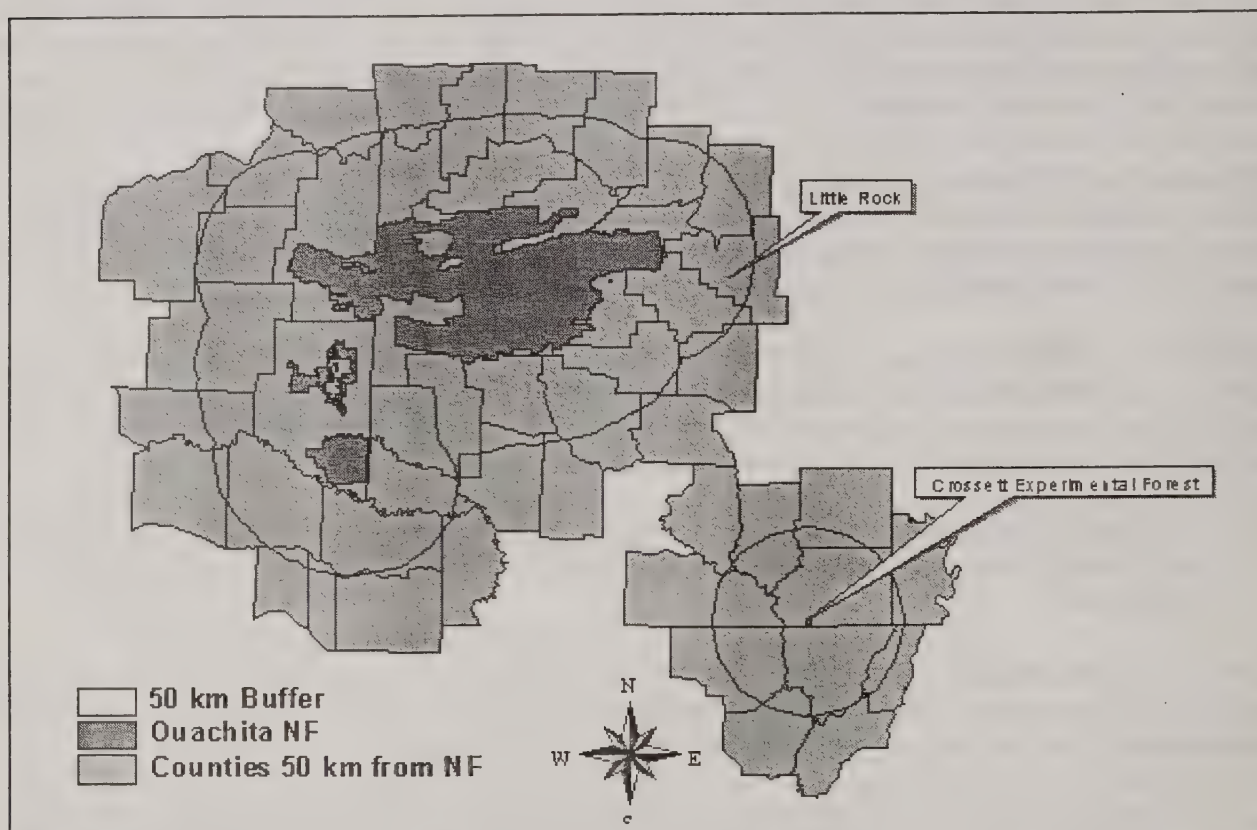


Figure 3.1 Air Quality Assessment Analysis Area

Air pollutants are generally classified as either primary or secondary pollutants. Those emitted directly to the atmosphere as products of combustion are classified as primary pollutants, and those formed when primary pollutants undergo atmospheric chemical reactions are secondary pollutants. Current air pollution impacts occurring on the Ouachita are the cumulative result of numerous sources. Some pollutants are of particular concern because of their impacts to both human health and ecosystems, and those pollutants are described in detail below.

Sulfur Dioxide (SO₂)

About 69 percent of SO₂ released to the air (11.2 million tons in 2000), comes from electric utilities, especially those that burn coal (US EPA, Progress Report 2002). Other sources of SO₂ are industrial facilities that derive their products from raw materials—such as metallic ore, coal, and crude oil—or that burn coal or oil to produce heat. Examples are petroleum refineries, cement manufacturing, and metal processing facilities. Also, locomotives, heavy marine equipment, and some non-road diesel equipment currently burn high sulfur fuel and release SO₂ in large quantities. Once SO₂ is emitted into the atmosphere, it undergoes chemical transformations to form secondary pollutants such as sulfates and sulfites. In the eastern United States, these secondary sulfur pollutants are the major contributors to visibility impairment and acidic deposition. Within 100 kilometers of the Forest, there are 35 coal-fired electric generating units (EGUs). The ten largest point sources of SO₂ located within 200 kilometers of the Forest, listed in Table 3.2, are also among the top 50 highest SO₂ emitting EGUs in the nation (US EPA, 2003 eGRID database, 2002 data).

Some of these facilities may have made reductions since the time the EPA eGRID data were compiled.

Table 3.2 Ten Largest “point” sources of SO₂ emissions within 200 km of the Forest (1999 data)

Tons/Year of SO₂	Source Name	County, State
111,619	Texas Utilities Electric Co.	Rusk, TX
100,122	Texas Utilities Electric Co.	Titus, TX
38,206	White Bluff	Jefferson, AR
37,958	Southwestern Electric Power Co.	Titus, TX
32,019	Entergy Mississippi Inc.	Washington, MS
31,456	Alumnitec Inc.	Garland, AR
29,669	Oklahoma Gas & Electric	Muskogee, OK
28,900	Entergy Mississippi Inc.	Warren, MS
26,839	Doe Run Company	Iron, MO
26,674	Independence	Independence, AR

Sulfur Dioxide (SO₂) and Acid Deposition

Acid deposition occurs when acidic compounds in the atmosphere are deposited on the earth's surface through rain, clouds, snow, fog, or as dry particles. These acidic inputs can contribute to degradation of stream water quality and decrease the amount of available base cations in the soil substrate. An ecosystem's susceptibility to soil nutrient losses and decreases in stream water acid neutralizing capacity (ANC) are influenced by many factors; most notably the bedrock geology/lithology types and the level of acidic inputs. Areas that receive high levels of acidic deposition and have bedrock geology with a naturally low buffering capacity may exhibit nutrient depletion and stream acidification. Stream chemistry data show that streams on the Forest have stable ANC values; however, there currently is some potential that soil nutrient depletion is occurring in sensitive areas. There are four National Atmospheric Deposition Program (NADP) monitoring sites in Arkansas, and the Clark County site is located closest to the Forest. The Fayetteville site located in Washington County, which began monitoring in 1980, has the longest data record of the four sites. The Warren and Buffalo Point sites began monitoring in 1982, and the Caddo Valley site in Clark County began monitoring in 1983.

It is important to note that trend analyses for NADP sites show a general decrease in the levels of sulfate (SO₄) deposition throughout the nation, especially over the last ten years. Of the Arkansas monitoring sites, this observed trend is most prominent in the data from the Fayetteville site. The decline in SO₄ deposition at NADP sites is consistent with the decreases in utility SO₂ emissions brought about by the Acid Rain Program (Title IV) of the 1990 Amendments to the Clean Air Act. The Acid Rain provision mandated significant reductions in SO₂ emissions.

Downward trends in SO₂ emissions and SO₄ deposition are predicted to have a positive effect on aquatic and soil resources on the Forest. Reductions are not great enough to reverse any existing effects, however. Additional emission reductions would be needed to restore any existing degraded streams or to protect streams that have not yet degraded.

During the last four decades, the eastern United States has seen a significant regional reduction in visibility, linked to a corresponding increase in ambient levels of visibility-impairing pollutants often referred to as fine particulates (Malm 1999). The estimated natural background visibility for the eastern United States is 93 ± 28 miles (NAPAP 1990), but average annual visibility at Caney Creek and Upper Buffalo Wildernesses is now only 31 miles (IMPROVE Data 2003). This degradation of visibility, both in terms of how far one can see and the clarity of the view is called regional haze. Although many fine particulate components such as elemental and organic carbon and nitrates contribute to visibility impairment, the major visibility-impairing pollutant in the eastern United States is sulfate; which comprises most of the measured fine particle mass (IMPROVE Data 2003). Further, sulfate particles are considered hygroscopic, which means their effectiveness in impairing visibility is magnified with increasing relative humidity. A humid atmosphere alone does not result in visibility reductions, but sulfate particles grow in size when they attach to atmospheric water molecules; a size that is more effective at scattering the sun's light (Malm 1999). About 60 percent of SO₂ emitted nationally comes from coal-fired power plants (US EPA, National Air Quality, and Emissions Trends Report Data 2003). Organics, released primarily from vegetation as volatile organic compounds (VOCs), are the second most important fine particles measured.

The Inter-agency Monitoring of Protected Visual Environments (IMPROVE), a national network of particulate monitors established for the protection of Class 1 wilderness areas, has monitored the constituents of regional haze for more than two decades. The IMPROVE monitor located on the Forest is at Eagle Mountain near Caney Creek Class 1 area. IMPROVE data from the Caney Creek monitoring site were used in the visibility description that follows.

The clearest days at Caney Creek have the lowest fine particle mass ($3.2 \mu\text{g}/\text{m}^3$) with estimated visibility at approximately 75 miles (using the annual average relative humidity of 82 percent). Sulfates comprise approximately 43 percent of the total fine particulate mass on these low mass days. On the highest mass ($16.9 \mu\text{g}/\text{m}^3$) days, the visibility is reduced significantly to approximately 20 miles (IMPROVE Data 2003). Sulfates comprise 69 percent of the total fine particulate mass on these high mass days. The days with the poorest visibility are most likely to occur May through September (Air Resource Specialists 1995), the time of year when the Forest has the greatest visitor use. Throughout the year, people are most likely to see a uniform haze, like a white or gray veil, that obscures the scenery (Air Resource Specialists 1995). Data from the IMPROVE monitoring site at Caney Creek show that for the 20 percent worst visibility days, the extinction values are decreasing and visibility is improving (Figure 3.2). Although there is insufficient data to establish a definite trend, visibility appears to be improving on both the worst and best days (<http://vista.cira.colostate.edu/views/>) as shown in Figure 3.3.

However, the Regional Haze Rule, a regulation aimed at reducing haze-forming pollutants in federally mandated Class 1 areas, is concerned mainly with improvements on the worst visibility days, and maintaining visibility on the best days. The following trend plots show visibility data measured in inverse megameters; a low measurement constitutes minimal light extinction and thus a good visibility day, a high measurement constitutes high light extinction and thus a poor visibility day. Further reductions in air pollutants impacting visibility will occur under the Regional Haze program and natural background visibility should be achieved by 2064.

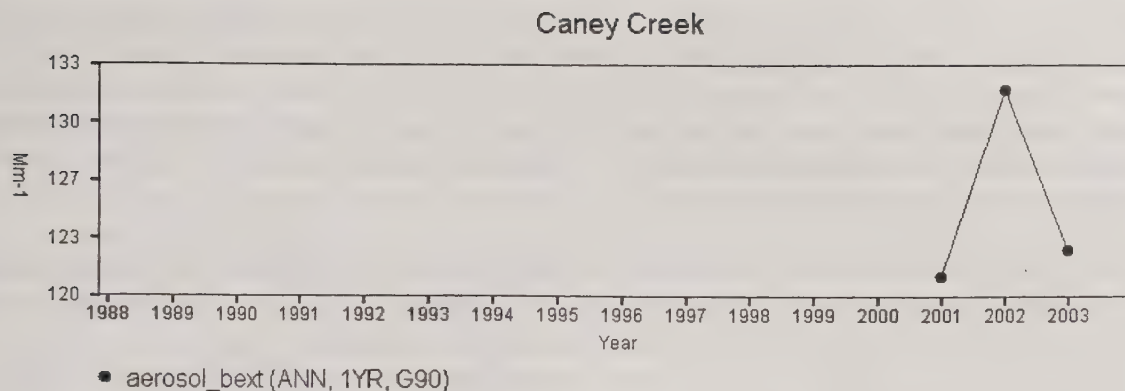


Figure 3.2 Light Extinction Monitored at Caney Creek on the 20% Worst Days - IMPROVE

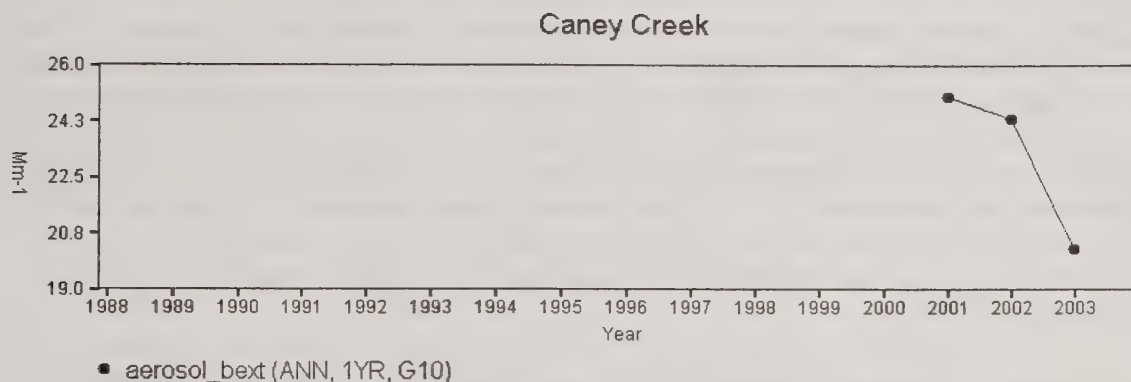


Figure 3.3 Light Extinction Monitored at Caney Creek on the 20% Best Days - IMPROVE

Nitrogen Oxides (NO_x)

More than 95 percent of nitrogen oxides (NO_x) emissions are in the form of nitric oxide. The transportation sector is the primary source of NO_x emissions. Point sources such as coal-burning electric generation facilities also contribute ambient NO_x levels. Smoke from wild and prescribed fire is also a contributor to NO_x production. Thermal NO_x production increases with increases in burn temperature. Relatively low-temperature prescribed burns emit very little NO_x as compared to wildfires. When trapped in sufficient quantities, nitrogen dioxide can be seen as a brownish haze. Secondary pollutants formed from nitrogen oxides such as nitrates also reduce visibility and contribute to acid deposition. In the presence of VOCs and sunlight, nitrogen oxides rapidly contribute to the formation of ozone. Available evidence suggests that nitrogen oxides are a controlling factor in the formation of ground-level ozone in rural areas of the Southern United States (Chameides and Cowling 1995).

Ozone (O₃)

Ground level ozone (O₃) is a secondary pollutant, and its production is highly dependent on the presence of nitrogen oxides and VOCs, sunshine, and elevated temperatures. Therefore, high ozone levels will occur only during periods of warm weather, plentiful sunshine, and high levels of ozone-forming pollutants. For this reason, the ozone monitoring season extends from April to October. Ozone occurs in both the stratosphere (upper atmosphere) and the troposphere (ground level). Although the presence of ozone in the upper atmosphere is highly beneficial, in sufficient

doses at ground level, ozone is considered a free radical, capable of killing living tissue in plants and in the human lung. Ozone's harmful effects are due to the pollutant's chemical make-up. The compound ozone is less stable than diatomic oxygen (the oxygen our bodies need). This unstable molecule reacts with plant and human lung tissues. In plants, death of the affected tissues sometimes occurs and in the human lung, inflammation and respiratory ailments, and in extreme cases, premature death can occur.

The NAAQS for ozone is set at levels considered protective of human health; however, damage to plants occurs at levels below the NAAQS for ozone. The ozone standard for human health, a new standard established in July of 1997 (CAAA sec 50.10), is set at a three year average of 0.085 parts per million (ppm) for a rolling 8-hour average. Areas that have an EPA Federal Reference Method (FRM) ozone monitoring site must meet these criteria; otherwise, the area is designated non-attainment for ozone. However, areas that do not have a FRM ozone monitoring site are designated as unclassifiable. Therefore, statewide attainment of the NAAQS is sometimes only as certain as the extent of the monitoring network. There are nine FRM ozone monitoring sites in five different counties in Arkansas. Of these five counties, three contain NFS lands and the other two are adjacent to NFS lands. The two monitors that are located adjacent to NFS lands have only shown minimal potential for damage and have not exceeded the ozone standard in the 11 years they have been in operation. In 1998, the 8 hour annual average for ozone was 0.071 ppm, with only 1 hourly occurrence where the level was greater than or equal to 0.100 ppm. This represents a growth loss of 2.1 percent for black cherry, one of the most sensitive species to ozone. In 2001, the 8 hour annual average for ozone was 0.078 ppm with only 2 occurrences where the level was greater than or equal to 0.100 ppm. This represents a growth loss of 3.4 percent for black cherry.

Particulate Matter (PM)

Particulate matter (PM) refers to any suspended atmospheric particle and is comprised of many different elements or compounds. It is defined based on various size classes, i.e., particles with an aerodynamic diameter of 10 microns are referred to as PM₁₀, and particles with an aerodynamic diameter of 2.5 microns are referred to as PM_{2.5}. PM can be either a primary or a secondary pollutant, both of which affect Forest resources. Primary particulates tend to be larger in size and are directly emitted from a combination of sources including combustion sources, agriculture, and road construction. Secondary fine particles are formed when combustion gases are chemically transformed into particles. The bulk of regional fine particles within the analysis area are the result of these chemically transformed combustion gases, such as sulfates and nitrates, mainly sulfate particles (transformed SO₂) from coal-fired power plants. These smaller, chemically transformed fine particles are largely responsible for regional haze.

Primary and secondary sources of PM outside of the Forest have a major impact on air quality, and Forest Service activities also can affect air quality. Smoke emitted from forest fires, both prescribed and wild, has the potential to affect air quality. Soot particles from wildland fires are a small but significant part of the total PM_{2.5} load. All alternatives contain standards that would minimize the impacts of smoke from prescribed burning on smoke-sensitive sites.

There are NAAQS for the two size classes of fine particulates (PM₁₀ and PM_{2.5}). The PM_{2.5} standard is newer (1997) and more stringent and is the standard of concern, because particles with a diameter of 2.5 microns or less have a greater ability to impair visibility and impact human health. The NAAQS for PM_{2.5} is a 24-hour average of no greater than 65 micrograms/m³, or an annual arithmetic mean of no more than 15 micrograms/m³. Currently, there are no areas near the Forest designated as non-attainment for fine particulate matter.

Summary of Pollutant Effects

Air quality data are collected for various pollutants in areas around the Forest. Regional sources of air pollution have not been found to have an adverse effect on Forest resources. Visibility in the Eastern U.S., however, has been reduced from a natural background range of 90 to 130 kilometers to an average visual range of 30 to 40 kilometers. Ozone symptoms have been documented on the foliage of ozone-sensitive species, such as black cherry and blackberry, but ozone damage has not been documented. A potential growth loss of 2 or 3 percent on black cherry is minor. Given these impacts currently discussed on the National Forest, air quality in the region can be labeled as good.

Fire Regime and Condition Class Definitions

Emissions estimates from prescribed burning are based, in part, on fire regimes and fire condition classes. Fire Regimes are classified by combinations of fire frequency and severity. Most of the Ouachita National Forest is in Fire Regime 1 and characterized as naturally having frequent (<35 year Mean Fire Interval), periodic fire of low severity and intensity. Mesic sites are mostly Fire Regime 3 characterized by longer fire return intervals (>35 years) and mixed severity. Fire Condition Classes are used to characterize both general wildland fire risk and ecosystem condition. There are three fire condition classes:

Condition Class 1 is characterized by: (a) fire regimes within or near an historical range, (b) low risk of losing key ecosystem components, (c) departure from historical frequencies by no more than one return interval, (d) intact and functioning vegetation attributes (species composition and structure) within an historical range.

Condition Class 2 is characterized by: (a) fire regimes moderately altered from their historical range, (b) moderate risk of losing key ecosystem components, (c) departure (either increased or decreased) from historical frequencies by more than one return interval, (d) moderate alteration from the historical range of vegetation attributes.

Condition Class 3 is characterized by: (a) fire regimes significantly altered from their historical range, (b) high risk of losing key ecosystem components, (c) departure from historical frequencies by multiple return intervals, (d) significant alteration from the historical range of vegetation attributes.

Fire ecology research has resulted in the classification of ecosystems based on these fire regime and condition classes (FRCC). Prescribed fire is integral in restoring fire-adapted ecological communities and in lowering wildfire risks to people living in the wildland urban interface/intermix areas.

Environmental Consequences for Air Quality

Prescribed fire is the main management activity on the Forest that can affect local and regional air quality; however, the current National Fire Plan and the Healthy Forest Initiative both direct the Forest Service to utilize prescribed fire more frequently. Despite potential air quality effects, prescribed fire can provide important and necessary ecological benefits in forested landscapes. EPA recognized these ecological benefits and developed the Interim Air Quality Policy on Wildland and Prescribed Fires (EPA 1998). This policy provides incentive and guidance to states for developing smoke management programs for dealing with the NAAQS and emissions from prescribed fires, while allowing burning programs to continue. Arkansas and Oklahoma are in the process of finalizing a Smoke Management Program, and the Forest has been involved in this process. In addition to complying with the States' Smoke Management Programs, the Forest will

continue to utilize smoke management techniques to protect smoke sensitive areas and public welfare, and to meet the NAAQS. All alternatives would require that the Forest use best available smoke management techniques.

Section 176 (c) of the CAA prohibits Federal agencies from engaging in or supporting any activity that does not conform to a State's Implementation Plan to bring an area back into attainment. As stated previously, there are currently no counties that contain or are adjacent to NFS lands that are in non-attainment status.

Public Health and Environmental Consequences

The EPA and States designate concentration levels for the criteria pollutants to protect public health. Federally designated maximum concentration levels are called National Ambient Air Quality Standards (NAAQS)—the amount of pollutant above which detrimental effects to public health (or welfare) may result (see tabulation below). NAAQS are set at a conservative level with the intent of protecting even the most sensitive members of the public, including children, asthmatics, and people with cardiovascular disease. If an area violates the NAAQS, that area becomes federally designated as a "non-attainment" area. An area that was one time in non-attainment, but has since met the NAAQS and other requirements, is called a maintenance area.

National and State Ambient Air Quality Standards

Pollutant	Time Period Average	Federal
Carbon Monoxide (CO)	1 hour, 8 hour	35 ppm, 9 ppm
Lead (Pb)	Calendar Quarter 90-day	1.5 $\mu\text{g}/\text{m}^3$
Nitrogen Dioxide (NO ₂)	Annual Arithmetic Mean Hourly Average	0.053 ppm
Sulfur Dioxide (SO ₂)	Annual Arithmetic Mean, 24-hour, 3-hour Hourly Average	0.03 ppm, 0.14 ppm, 0.50 ppm
Ozone (O ₃)	8-hour, Hourly Average	0.12 ppm, 0.08 ppm
PM ₁₀	Annual Arithmetic, Mean 24-hour	50 $\mu\text{g}/\text{m}^3$, 150 $\mu\text{g}/\text{m}^3$
PM _{2.5}	Annual Arithmetic, Mean 24-hour	15 $\mu\text{g}/\text{m}^3$, 65 $\mu\text{g}/\text{m}^3$

ppm=parts per million

$\mu\text{g}/\text{m}^3$ = micrograms per cubic meter

Criteria pollutants such as sulfur dioxide and nitrogen dioxide have the potential to cause adverse effects on plant life, water quality, aquatic species, and visibility. However, sources of these pollutants are generally associated with urbanization and industrialization rather than with natural resource management activities or wildfire. Wildfire and natural resource management activities such as timber harvest, road construction, site preparation, mining, and fire use can generate ozone, carbon monoxide, and particulate matter. While ozone is a byproduct of fire, potential ozone exposures are infrequent (Sandberg and Dost 1990). Carbon monoxide is rapidly diluted at short distances from a burning area, as fires are generally spatially and temporally dispersed, and pose little or no risk to public health (Sandberg and Dost 1990). The pollutant of most concern to public health and visibility within and downwind of the analysis area is particulate matter. Although particulate matter has no serious effects on ecosystems because fire and smoke are ecological

processes (ICBEMP 2000), smoke does affect human health and visibility. Because of its smaller size, PM_{2.5} poses greater health risks than PM₁₀. Large volumes of particulate matter can be produced from fire and, depending on meteorological conditions, may affect large areas for extended periods.

Each day, concentrations of various air pollutants are measured in areas across the States. After the amount of pollution is measured, it is compared to the federal standard. To make it easy to compare all the different pollutants and determine the air quality, the EPA (EPA June 2000) developed the Air Quality Index (AQI) to relate all criteria pollutants to the same scale. Tables 3.3 and 3.4 display the 24-hour AQI breakpoints for PM_{2.5} and PM₁₀. When concentrations reach "Unhealthy for Sensitive Groups," cautionary statements are issued to suggest that people with respiratory conditions or heart disease, the elderly and children, and those who work, exercise, or spend time outdoors, should limit prolonged exertion. EPA developed the health indices based on 24-hour averages.

Table 3.3 EPA's Air Quality Index (AQI) for Particulate Matter 2.5 (PM_{2.5}), including the Breakpoints of PM_{2.5} concentrations for the Air Quality Index Rankings

PM _{2.5} 24-hr Avg. Conc. (µg/m ³)	Index Values	Visibility (Miles)	Level of Health Concern	Cautionary Statements
0.0 – 15.4	0-50	> 10	Good	None
15.5 – 40.4	51 – 100**	5.1 – 10.0	Moderate	None
40.5 – 65.4	101 - 150	3.1 – 5.0	Unhealthy for Sensitive Groups	People with respiratory or heart disease, elderly, and children should limit prolonged exertion.
65.5 – 150.4	151 – 200	1.6 – 3.0	Unhealthy	People with respiratory or heart disease, the elderly, and children should avoid prolonged exertion, everyone else should limit prolonged exertion.
150.5 – 250.4	201 – 300	1.0 – 1.5	Very Unhealthy	People with respiratory or heart disease, elderly, and children should avoid any outdoor activity, everyone else should avoid prolonged exertion.
250.5 +	301 - 500	< 1.0	Hazardous	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly and children should remain indoors.

** An AQI of 100 for PM_{2.5} corresponds to a PM_{2.5} level of 40 micrograms per cubic meter (24-hr avg.)

Table 3.4 Air Quality Index (AQI) and Particulate Matter 10 (PM₁₀) and 2.5 (PM_{2.5}) Breakpoints

AQI Value	Health Concern	PM ₁₀ Breakpoints µg/m ³	PM _{2.5} Breakpoints µg/m ³
0 – 50	Good	0 – 54	0 – 15.4
51 – 100	Moderate	55 – 154	15.5 – 40.4
101 – 150	Unhealthy for Sensitive Groups	155 – 254	40.5 – 65.4
151 – 200	Unhealthy	255 – 354	65.5 – 150.4
201 – 400	Very Unhealthy	355 – 424	150.5 – 250.4
> 400	Hazardous	> 424	> 250.5

µg/m³ = micrograms per cubic meter

While the NAAQS evaluate smoke impacts related to public health, smoke often causes public concern at lower levels. One study compared the number of complaints about smoke to the measured PM₁₀ concentrations (Acheson and others 2000). Complaints increased when PM₁₀ concentrations were as low as 30 micrograms per cubic meter. The 24-hour threshold for the PM₁₀ NAAQS is 150 micrograms per cubic meter (Table 3.4). The Air Quality Index for a concentration of 30 micrograms per cubic meter would be rated as “Good,” indicating no health concerns.

Visibility Impairment (Mandatory Class 1 Areas) – Class 1 areas are set aside under the Clean Air Act to receive stringent protection from air quality degradation. Mandatory Class 1 areas are those with certain Federal designations in existence prior to the 1977 amendments to the Clean Air Act. These include 1) international parks, 2) national wilderness areas that exceed 5,000 acres in size, 3) national memorial parks that exceed 5,000 acres in size, and 4) national parks that exceed 6,000 acres in size.

The 1977 amendments established a national goal of “the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class 1 Federal areas which impairment results from manmade air pollution.” Fine particles (PM_{2.5}) are the primary cause of visibility impairment in Class 1 areas although gases also contribute. Visual range is one indicator of pollution concentrations in the air. Visibility variation occurs as a result of the scattering and absorption of light by particles and gases in the atmosphere. Without pollution effects, an estimated natural visual range is 90 miles in the eastern U.S. and up to 140 miles in the western U.S. (EPA November 2001).

In 1980, EPA’s visibility regulations were developed to protect mandatory Class 1 areas from human-caused impairments reasonably attributable to a single or small group of sources. In contrast, EPA proposed in 1997 a new regulatory program to protect mandatory Class 1 areas from visibility impairment produced by a multitude of sources that emit fine particles and their precursors across a broad geographic area. This Regional Haze Rule (40 CFR, Part 51) addresses impacts from numerous and broad based sources that cannot be easily pinpointed. The rule calls for states to establish goals for improving visibility in mandatory Class 1 areas and to develop long-term strategies for reducing emission of air pollutants that cause visibility impairment. Fire use is one of the sources addressed by the regulations.

Interim Air Quality Policy on Wildland and Prescribed Fires

On May 15, 1998, the EPA issued the *Interim Air Quality Policy on Wildland and Prescribed Fires* (referred to as the *Interim Policy*) to address impacts to public health and welfare. This policy was prepared in response to anticipated increases in fire use that were expected to occur as a result of implementing the *1995 Fire Management and Policy Review*, which outlined a need to restore fire as an ecosystem process in many wildlands. The *Interim Policy* was prepared to integrate the goals of allowing fire to function in its ecological role for maintaining healthy ecosystems while protecting public health and welfare by mitigating the impacts of air pollutant emissions on air quality and visibility. The policy was developed with the active involvement of stakeholders including the U.S. Department of Agriculture. The *Interim Policy* is Federal policy that reconciles the competing needs to use fire and maintain clean air to protect public health. The *Interim Policy* is interim only because it does not yet address agricultural burning on regional haze (EPA 1998). It is not interim with regard to how States, Tribes, and Federal land managers are expected to address smoke from prescribed fires.

The *Interim Policy* suggests that air quality and visibility impact evaluations of fire activities on Federal lands should consider several different items during planning (EPA 1998). Items discussed in detail in this EIS include a description of applicable regulations, plans, or policies, identification of sensitive areas (receptors), and the potential for smoke intrusions in those sensitive areas. Other important considerations also discussed are applicable smoke management techniques, participation in a basic smoke management program, and potential for emission reductions. Two *Interim Policy* planning items mentioned below in this section will not be explained to the same level of detail as those listed above. These include ambient air quality and visibility monitoring plans, and the cumulative impacts of fires on regional and subregional air quality. In addition to these listed items, issues regarding public (transportation) safety are also discussed.

Smoke Management Program – The *Interim Policy* calls on States (and Tribes) to develop smoke management programs and for federal land managers to participate in them. Basic elements of a smoke management program include 1) a process to authorize burns; 2) a requirement that land managers consider alternatives to burning to reduce air pollutant emissions; 3) a requirement that burn plans include smoke management components such as actions to minimize fire emissions; evaluation of smoke dispersion; actions that will be taken to notify populations and authorities prior to burns to reduce the exposure of people in sensitive areas if smoke intrusions occur; and air quality monitoring especially in sensitive areas; 4) a public education and awareness program; 5) a surveillance and enforcement program; and 6) periodic review of its program for effectiveness. In exchange for States (and Tribes) proactively implementing smoke management programs, EPA intends to exercise its discretion not to re-designate an area as non-attainment if convincing evidence shows that fire use caused or contributed to violation of the daily or annual PM₁₀ or PM_{2.5} standards. The State (or Tribe) must certify to EPA that at least a basic program has been adapted and implemented.

Alternatives To Burning And Emission Reductions – Even though the *Interim Policy* acknowledges that fire is a necessary and non-replaceable treatment to meet certain objectives, land management agencies are encouraged to consider whether there are alternatives to burning in order to reduce emissions. In general, mechanical treatments are considered the most viable means of reducing emissions, though in some ecosystems, chemicals may be an option. However, the *Interim Policy* also acknowledges that considering alternatives to burning is not without

tradeoffs and limitations. The policy states that mechanical opportunities are normally limited to:

- Accessible areas (those with roads, harvest systems, etc)
- Terrain that is not excessively rough
- Slopes equal to or less than 40 percent
- Areas not designated as National Parks or Wilderness
- Areas without listed species
- Areas without cultural or paleological resources.

In addition to the items listed above, other safeguards, including land allocations, desired conditions, objectives, and standards, would also limit opportunities for mechanical treatments.

Effects Common to All Alternatives

The level of prescribed fire use is expected to increase under Alternatives C and E. However, the level of increase varies between these alternatives. The level of prescribed fire use is expected to remain at or near current levels under Alternatives A (68,000 acres), B (125,000 acres), and D (100,000). In recent decades, the Ouachita National Forest has burned as little as 52,000 acres to as much as 134,000 acres in a single year. These levels fall near the rates of Alternatives A, B, and D, respectively. Despite the varying levels of prescribed fire usage, all wildland fires result in pollutant emissions, which can impact air quality on and off the Forest. Fine particulates are the major pollutants of concern emitted from prescribed fires and are also a criteria pollutant regulated under the CAA. As described previously, fine particulates are a concern in terms of human health and visibility impairment. Prescribed fires also, to a lesser extent, emit nitrogen oxides, which are precursors to ozone formation and are regulated as a surrogate for ozone. Though both VOCs and NO_x contribute to ozone formation, NO_x is the limiting factor in ozone production. Because of this, NO_x emissions from prescribed fires will be assessed in this analysis in addition to PM emissions. Thermal NO_x production increases with increased burn temperature, and relatively low-temperature prescribed fires emit very little NO_x as compared to wildfires. Prescribed fire provides opportunities to minimize the impacts of smoke on local communities, while a wildfire situation does not typically afford such an opportunity. Ozone is of concern between April through October. During these times, the Forest burns very few acres. There would be no impacts from ozone under any of the alternatives.

Sensitive Areas – Air quality sensitive areas include places that may experience smoke related impacts to health, visibility, and public (transportation) safety. For this EIS, population centers and Impact Zones, non-attainment areas/maintenance areas, Class 1 areas, and major travel routes and airports as sensitive areas appropriate to address for this coarse-scale analysis were considered. All of these types of areas are represented within the 100-kilometer area of consideration. Non-attainment and mandatory Class 1 areas are designated through federal and state processes. Other sensitive areas have been identified through other processes. Evaluation of smoke impacts during project-level analysis may include other types of sensitive areas such as hospitals, airstrips, and campgrounds, but these are too fine-scale to be evaluated for the entire Forest in this EIS.

Public Health – There are no non-attainment/maintenance areas in the area of consideration, which means NAQMS have not been exceeded, and there is no discernible public health risk. There are no public health concerns for any of the alternatives except Alternative C, because Alternative C would contain a proposed burning program of 250,000 acres, on average, annually. Also, wildfires could cause pollutant levels in these areas to increase to levels that cause a public health risk.

Public (Transportation) Safety – Smoke can affect visibility on roads creating hazardous conditions for travelers. Smoke can be especially hazardous in low-lying areas where fog can form, further reducing visibility. Several traffic accidents have occurred on highways the Southeast U.S. from visibility reductions due to smoke. Hazy conditions can also affect aviation operations at airports by reducing visibility. There are several primary travel routes (e.g. highways) and airports throughout the analysis area. Potential impacts of smoke effects on visibility and impacts to transportation safety depend on amount, timing, and location of fire use, and the meteorological conditions that influence dispersion. Potential effects of smoke on specific areas related to transportation safety cannot be evaluated at this scale because of the spatial and temporal nature of this concern and will not be discussed or analyzed further in this document. Mitigations for these areas are considered as part of project-level planning and implementation.

Direct and Indirect Effects by Alternative

Prescribed Fire Emissions

The areas on the Forest that are most suitable for, and in the most need of prescribed fire treatments were identified based on best estimates of the fire regimes for the Forest landscape and current Condition Classes of these fire regimes, given the historic fire activity. Figure 3.4 shows the estimated Condition Classes on the Forest.

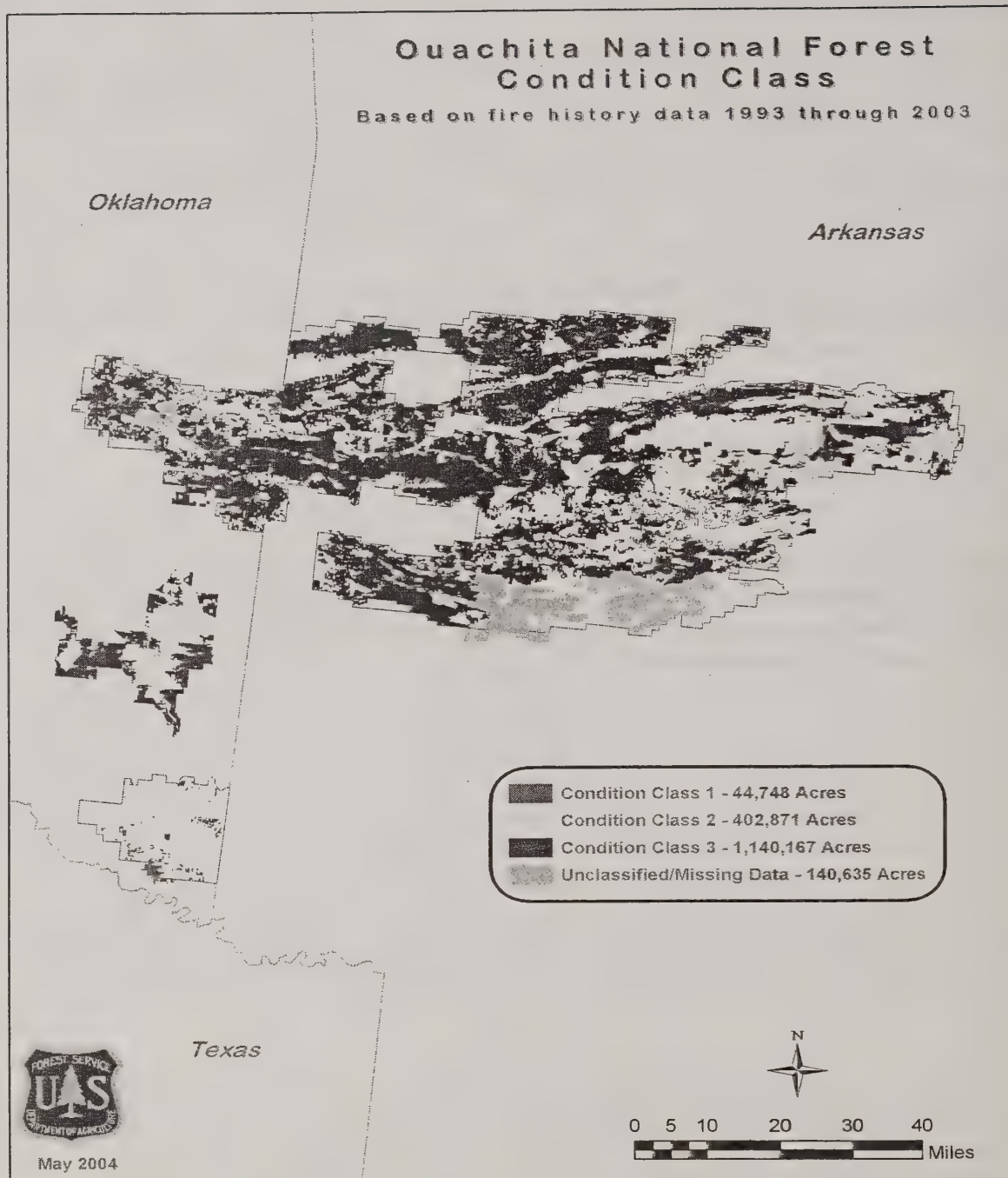


Figure 3.4 Best Estimates of Fire Condition Classes on the Ouachita

Areas in Condition Class 3 are considered to be the furthest from the reference condition for that area, while those in Condition Class 1 are more or less within the natural cycle. Prescribed fire activities will be concentrated in areas that are near Communities at Risk and/or the Wildland Urban Interface and in Red-cockaded Woodpecker (RCW) areas (to maintain Condition Class 1 and meet the requirements of the RCW Recovery Plan).

As more acres are restored to Condition Class 1 in ecological communities adapted to low-intensity periodic fire (Fire Regime 1), the woodland condition would prevail over a larger part of the landscape. In this condition, surface fuels are the primary component contributing to fire behavior. This would represent a change in current fuel profiles where surface fuels, aerial and ladder fuels

can all contribute to fire behavior. The woodland types would include a more “grassy” fuel component (Fuel Model 2) compared to the closed canopy forest fuel type (Fuel Model 9). In the woodland condition, total fuel loading would be less than in the forest condition (as much as half the current average fuel loading in tons per acre). There would not be as much of a woody live and/or dead fuels component to contribute to either flaming or smoldering fire behavior. In prescribed burns and wildfires, the grassy component would burn more easily, faster, and produce fewer emissions (both in concentration and duration) as compared to current fuel conditions. Fire intensity would be less in the woodland condition and there would be less likelihood (risk) of stand-replacement burns. Suppression efforts would be less costly while providing a higher degree of safety to both the public and firefighters.

Management prescriptions were assessed in conjunction with the condition class categories to determine the relative number of acres suitable for prescribed burning within each alternative based on its management emphasis. Using this number, an estimate of potentially treatable acres was developed for each alternative.

Emissions estimates per acre burned in each alternative were derived using the First Order Fire Effects Model (FOFEM, Version 5.00; Rocky Mountain Research Station). This emissions estimate was then multiplied by the projected average acres that would be burned each year in each alternative to get an annual emissions estimate. To assess air quality effects, these annual emissions estimates from prescribed fire have been compared to regional annual emissions (all counties within 50 kilometers of the Ouachita National Forest) in tons per year. The number of acres treated with prescribed fire annually is highly dependent on weather and climatic conditions among other local factors. Because there is no way to predict where and when individual prescribed burns will occur, this analysis broadly assumes that the same number of acres will be treated with prescribed fire annually at the maximum level for each alternative. In reality, there would likely be some years with little prescribed fire activity, while others may be much closer to the maximum annual estimate.

Based on fuels inventory and monitoring data taken over the last four years, but not yet published, it appears that FOFEM may be over-estimating by two to four times the actual amount of fuel consumed in pine types when prescribed burning takes place. FOFEM assumes some larger fuels (100 and 1000-hour fuels) are consumed during prescribed burning when, in fact, they often are not. More accurate fuels information will soon be published on the Fire Learning Network.

The regional emissions data were obtained from the most recent and accurate emissions database available. Currently, this is the 2002 VISTAS base case emissions database. It can be assumed that if predicted emissions from the proposed prescribed fire activities contribute a small enough percentage to the total pollution load, they would not impact attainment of the NAAQS. Most counties within 50 kilometers of the Ouachita National Forest are either in attainment or unclassifiable status.

Because site-specific burn units have not been identified within the scope of this programmatic analysis, fuel loading characteristics are unknown at this time. For this reason a range of fuel loading characteristics that were deemed representative of portions of the Forest with potentially treatable acres were used in the emissions analysis. Fuel loading characteristics for more mesic sites with mixed oak and hardwood species were modeled to represent the treatable acres on the north-facing slopes of the Forest, and fuel loading characteristics for dryer mixed oak and chestnut oak sites were modeled to represent the south-facing slopes. The range of potential emissions from the various fuel loading characteristics and their effects on air quality are presented in Table 3.5.

Comparison of Effects by Alternative — Emission estimates per acre burned were derived from the FOFEM model. The number of acres burned varied by alternative, and thus the prescribed fire annual emissions also varied. Under Alternatives A, B, and D maximum prescribed fire usage is expected to remain at current levels, between 52,000 and 134,500 acres a year (data from Forest monitoring reports). Under Alternative C, prescribed fire usage would increase to an average of 250,000 acres annually. Under Alternative E, the prescribed fire acreage would be approximately 180,000 average annual acres. Historical records show that the current level of prescribed burning is not expected to cause non-attainment/maintenance areas because of past prescribed burning (a low of 52,342 acres in 2001 and a high of 134,386 acres in 2004); currently, there are no non-attainment areas. Emission estimates by alternative are presented in Table 3.5.

Table 3.5 PM_{2.5} Estimated Emissions from Prescribed Burning (Percent Increase over 1990 Plan Prescribed Fire Projections)

Category	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Prescribed Burn Acres (projected annual avg.)	68,000	125,000	250,000	100,000	180,000
Tons of PM _{2.5} produced from prescribed burning	From 4,893 to 6,073	From 8,994 to 11,163	From 17,988 to 22,325	From 7,195 to 8,930	From 12,951 to 16,074

The Forest will use the best available smoke management techniques and technology to alleviate nuisance or human health impacts of smoke in local communities and smoke sensitive areas, and avoid impacting attainment status for any criteria pollutant in areas where burns are conducted.

Cumulative Effects

Other than the proposed increases in annual prescribed fire listed in Table 3.5, there are no expected increases (above background) in burning in the analysis area. Table 3.6 compares alternatives using PM_{2.5} and PM₁₀. There are fewer data on PM_{2.5} emissions, because EPA has not been tracking PM_{2.5} emissions for very long. Review of the data indicates that the Forest Service emissions may not have been included in the emissions inventory of PM_{2.5}. The emissions inventory for PM₁₀ appears to be more accurate. It is assumed that a more reliable picture of the percentage increase from regional emissions would be obtained by comparing the PM₁₀ emissions, because EPA has been tracking this pollutant for almost 15 years. Using PM₁₀ as the better measure for comparison, Alternative C would contribute the greatest percentage of PM₁₀ (9 percent) when compared to regional emissions, followed by Alternative E with 6 percent. Contribution of these pollutants is tied directly to acres estimated to be burned with prescribed fire.

Table 3.6 Cumulative Emission Estimates for Prescribed Burning on the Forest, by Alternative

Category	Alt A		Alt B		Alt C		Alt D		Alt E	
	PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀
Emissions (Max. Tons per Year)	6,073	6,650	11,163	13,200	22,325	26,400	8,930	10,560	16,074	19,008
Total Regional Emissions (Tons per year)	81,679	306,244	81,679	306,244	81,679	306,244	81,679	306,244	81,679	306,244
% Rx Fire	7%	2%	14%	4%	27%	9%	11%	3%	20%	6%

Topography and Soils

The Ouachita Mountains are some of the oldest landforms in Arkansas and Oklahoma and have been influenced by many climatic changes. Deposition and weathering of geologic material over time has produced the Forest's topography and landscapes as well as its soil parent material.

Soil is a complex mixture of minerals, organic compounds, living organisms, air, and water. Soils develop slowly from various parent materials and are modified by time, climate, macro- and microorganisms, vegetation, and topography. For the Ouachita National Forest, it is estimated that several hundred years are required to develop one inch of topsoil. Ecological health, diversity, healthy watersheds, and sustained productivity are all dependent on good soil management.

Past land use has affected most of the soils of the Forest. Extensive logging, mining, grazing, and farming have occurred on these lands since the mid to late 1800s, resulting in some areas with thin topsoil over subsoil due to erosion. Soil physical characteristics such as texture, structure, drainage features, depth to bedrock, rock content, moisture content, and physiographic position and location determine their productive potential. This soil information is used to make such management interpretations as erosion hazard and compaction hazard. Soil management interpretations help determine best use and acceptable management activities for maintaining or improving productivity.

The Ouachita National Forest lies within three Physiographic Regions: the Ouachita Mountains, Arkansas Valley, and Western Gulf Coastal Plains. Soils in the Ouachita Mountains developed mainly from tilted and fractured sandstone and shale or from novaculite and chert, which formed during the Pennsylvanian to Ordovician geologic periods (about 300-400 million years ago). Elevations range from about 450 to 2,700 feet above mean sea level in the Ouachita Mountains and about 250-500 feet above mean sea level on the Western Gulf Plain Physiographic Region. The Ouachita Mountains are characterized by east-west trending hills, mountains with narrow ridge tops, and narrow to moderately wide stream terraces and floodplains. The soils on stream terraces and floodplains developed during the Quaternary Period primarily from these same geologic materials. Slope gradients range from zero to over 60 percent. Approximately 20 percent of the Forest contains slopes greater than 35 percent.

The soil resources of the Forest have been classified, and there are 165 different soil mapping units, which represent 77 different soil series. These soil series range from shallow soils (less than 20 inches deep to bedrock) to very deep soils (greater than 60 inches deep). Forest site productivity ranges from about 30 to 85 in the Ouachita Mountains and up to 110 in the Western Gulf Coastal Plain Physiographic Region.

The desired condition of the soil resource is to maintain the productive potential of the land and to support the maintenance of the natural hydrologic functioning of watersheds, the functional integrity of the natural drainage system, and the inherent capacity of watersheds to absorb and retain water. This is accomplished through proper planning and implementation of all soil disturbing activities according to the Design Criteria in the Forest Plan (See Part 3 of the Forest Plan).

Direct and Indirect Effects

Accelerated erosion, soil compaction, and displacement are the primary concerns associated with maintaining long-term soil productivity. Erosion, compaction, and displacement are closely associated with increased runoff and sedimentation. Factors that determine erosion are rainfall intensity, soil erodibility, soil cover conditions, and steepness and length of slope. Approximately 80 percent of the Forest has been rated as having a slight or moderate erosion hazard and 20 percent

as having a severe erosion hazard rating. Factors that determine susceptibility to compaction are surface texture, surface rockiness, and soil moisture. About 90 percent of the forest has been rated as having a slight or moderate compaction hazard, while the remaining 10 percent has a high or severe compaction hazard rating. Activities that contribute to erosion, soil compaction, and displacement include construction, maintenance, and use of temporary and permanent roads; vegetation management; recreation, including OHV use; grazing; and minerals management.

Soil Erosion

Soil erosion is the detachment and transport of individual soil particles by wind, water, or gravity. Ground-disturbing activities influence erosion principally because vegetative ground cover is removed, allowing soils to be removed by runoff. A soil's susceptibility to erosion varies by soil type. A moderate or slight erosion hazard indicates that standard erosion control measures, such as installing water bars, plus seeding and fertilizing firelines, ripping on the contour, and not exposing more than 20-30 percent of mineral soil in treatment areas are sufficient to prevent excessive erosion. Soils with severe erosion hazard ratings require more intensive efforts to reduce the potential for accelerated erosion both during and after the soil disturbing activity.

Natural erosion rates from undisturbed forest soils are very low, generally around 0.01 to 0.10 tons/acre/year (Scoles and others). In forested watersheds, the most common cause of accelerated erosion is creation and use of forest roads, although timber harvest, site preparation, mineral activities, grazing, trail construction and use, and some recreation uses, such as OHV trails, also have the potential to remove or disturb the surface or cover of soils. Erosion rates tend to remain greater on these areas for many years following their use due to altered soil structure and loss of infiltration. Erosion is most effectively managed by leaving sufficient amounts of the forest floor (slash, and other onsite woody debris material) intact, not overly compacting soils (which would reduce water infiltration rates and result in increased overland flow), and not allowing water to concentrate and channel on roads or trails.

Under all alternatives, erosion control measures will be implemented to reduce the potential effects of proposed project work. To reduce soil loss from roads and improve water quality, erosion control measures will include re-shaping the road prism (where needed), scarifying roads to be closed to provide an effective seedbed, water barring, seeding and fertilizing, and gating roads to be closed to restrict traffic. During reforestation activities and wildlife pond construction, erosion control measures will include proper timing of activities to avoid heavy equipment operation during wet weather, and drainages will be crossed at pre-selected sites and at right angles to the stream. Making cross-country travel by OHVs unsuitable (Alternatives B through D) would lead to better monitoring and management of remaining OHV-related impacts. Use of erosion control measures is specified in plan standards and required for all projects.

The average annual erosion potential of each alternative is shown below for the first and fifth decades. Erosion potential is expressed as a relative value based on the average C-factors (cover factor from the universal soil loss equation) and accumulated for the annual projected vegetation management activities.

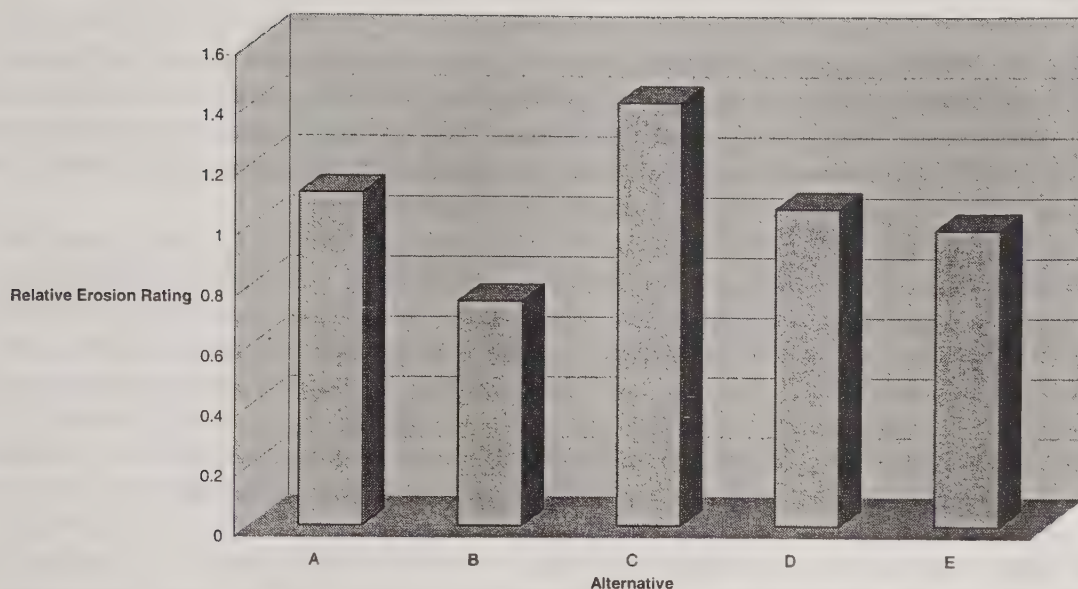


Figure 3.5 Erosion Potential in First Decade

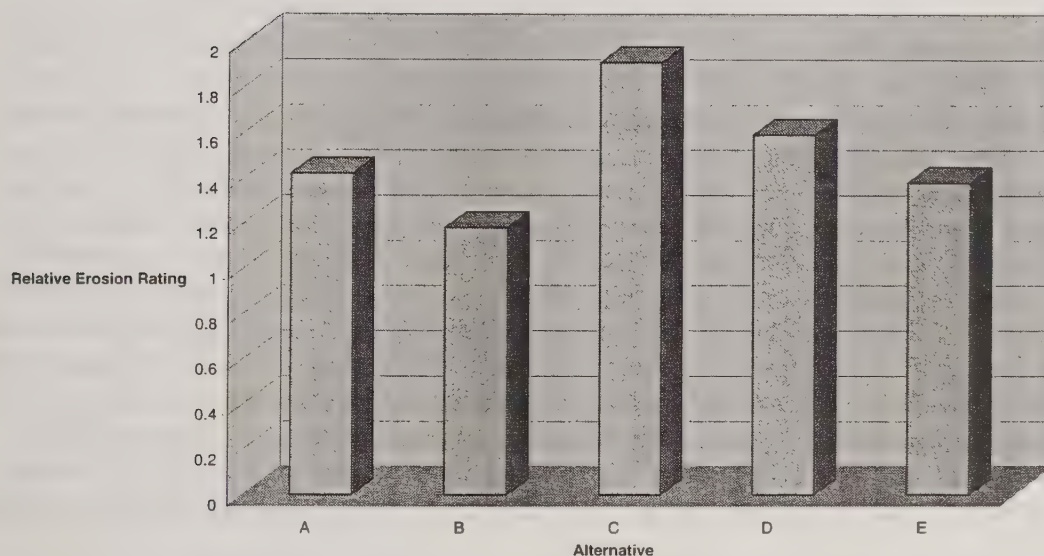


Figure 3.6 Erosion Potential in Fifth Decade

Soil Compaction and Soil Displacement

The use of large machinery in forestry operations has the potential to cause impacts to soils in the form of soil compaction and soil displacement. Compaction increases soil bulk density and decreases porosity as a result of the application of forces such as weight and vibration. Compaction can detrimentally impact both soil productivity and watershed conditions by causing increased overland flow during storm events and reduced plant growth due to reduced amounts of water entering the soil and its reduced availability for plant growth, a restricted root zone, and reduced soil aeration. Heavy equipment operations may also affect soil productivity by soil displacement. Soil displacement is generally the result of topsoil transfer from one site to another caused by tire or track slippage; blading of roads, decks, or firelines; or from intensive skid traffic areas such as main skid trails.

Soils are classified as having a slight, moderate, high, or severe compaction hazard rating. Degree of moisture in the soil greatly affects its hazard to compaction, and December to June is generally considered the period on the Forest when the soil moisture content is greatest. Approximately 90 percent of the soils on the Forest have a slight or moderate compaction hazard rating. The soils on the remaining area have a high or severe compaction hazard rating.

The weight of heavy machinery used for harvesting and road construction can compact soils, decreasing productivity. Compaction monitoring on the Ouachita National Forest has found that compaction can be excessive on heavy traffic areas such as landings, primary skid trails, and temporary roads, particularly when the soils are wet or rock-free, or nearly rock-free, in the surface six inches (USDA-Forest Service, 1990a). Mitigation measures, such as requiring a limited operating season on soils with a high or severe compaction hazard rating (Amendment 27 to the 1990 Forest Plan) and limiting activity when soils are wet are used to limit compaction.

Under all alternatives, measures to minimize compaction and displacement include operating heavy equipment when soils are dry to reduce slippage; operating over intact forest floor and downed woody debris; constructing as few firelines, roads, skid trails, and logging decks as possible; and redistributing topsoil back over areas where it has been removed. In addition, heavy equipment operation will be suspended, or redirected to drier locations when tire or track ruts approach two inches deep or greater off the dedicated transportation system.

Fire Effects on Soil

Prescribed fire has both positive and negative effects on soils. Prescribed fires can potentially result in the same types of impacts on soils as wildfires; however, these burns are generally planned to burn at low to moderate intensities, limiting adverse impacts. Most burning will occur during the cooler winter or early spring months when flame lengths and fire severity should be low to moderate. Only the upper forest floor litter layer consisting of non-decomposed or semi-decomposed pine needles, leaves, and small twigs should be consumed. This will leave the underlying layer, which consists of more decomposed needles, leaves, and twigs, to protect the mineral soil. This organic layer, along with the trees and other living vegetation on the area, should prevent or minimize any soil movement. These fires are often designed to reduce fuel loadings that diminish the likelihood of detrimental impacts from subsequent wildfires. Negative effects are principally associated with severe burns, which may kill soil biota, alter soil structure, consume organic matter, and remove site nutrients and lead to soil erosion and nutrient leaching during later rainstorms.

High-severity burns, usually wildfires, can adversely affect long-term soil productivity. Excessive nutrient loss from severely burned areas may occur through atmospheric volatilization, deep leaching, and loss of soil organic matter. Even soil structure and infiltration rates can be seriously compromised, leading to accelerated erosion rates. High-severity prescribed burns may unintentionally occur where overstory protection is not required, or during the growing season burns when litter layers are typically drier.

In contrast to high-severity burns, properly managed moderate-severity burns generate acceptable or beneficial effects on soil. The Ouachita-Ozark Vegetation Management EIS (USDA Forest Service 1999a) notes that light to moderate-severity burns will result in little to no detectable change in the amount of organic matter in surface soils. These burns will not change the structure of mineral soils because the elevated temperatures are of brief duration. Light to moderate-severity burns will expose soil on less than 20 percent of the area and recovery usually takes one year or less. Soil biota is reduced but recovers quickly (USDA Forest Service 1990b). In addition, light to moderate severity fires accelerate the recycling process by releasing nutrients in the soil, thereby

stimulating nutrient uptake by vegetation. Even though prescribed fires release some nitrogen gases (N₂) mainly from forest floor material, overall nitrogen budgets are not significantly affected. Post-burn, nitrogen is restored by atmospheric input from lightning, rain, and dust and through increased levels of nitrogen fixation by wild legumes and soil bacteria. Prescribed fires may also help in reducing rates of soil acidification (USDA Forest Service 1990b).

Because prescribed fire is planned, there are usually fewer firelines on steep slopes, which have a higher potential to erode. In some cases, such as fuels reduction burns or wildlife enhancement burns, it is necessary to burn on slopes greater than 35 percent. Firelines are stabilized with water bars and seeding after the burn is completed to help prevent erosion, and rehabilitation is required if severe impacts occur.

Recent research and monitoring in the Ouachita Mountains indicate that soil quality and long-term productivity have improved under shortleaf pine-bluestem ecosystem restoration for which restoration treatments include repeated prescribed burning at 3-5 year intervals. Masters (1993) found pH to increase slightly on harvested and burned areas when burned on a 3-4 year cycle. Liechty and others (2005) found that pine-bluestem stands that had been established 20 years earlier on the Poteau Ranger District had increased levels of soil pH, mineralizable nitrogen, total nitrogen and carbon, calcium, and organic matter as compared to the pine-hardwood control stands.

Site preparation burns will be of moderate or less intensity and less than 30 percent mineral soil will be exposed. Other measures that would be implemented to minimize soil erosion and sediment production include burning during the dormant season for fuels reduction or wildlife enhancement burns to assure a light to moderate burn intensity to retain at least ½-inch of forest floor material over at least 70 percent of the treatment area. In addition, all firelines constructed or re-opened by heavy equipment will be water barred, seeded, and fertilized upon completion of the burn, and any firelines planned on slopes greater than 35 percent will be constructed by hand. Alternative A maintains a program for prescribed fires of an average of 68,000 acres annually and Alternative D would have a program for prescribed burning of about 100,000 average annual acres over a ten-year period. Alternative B represents the current prescribed burn program of 125,000 average annual acres. Alternative C represents the greatest potential for effects to soils as the program of average annual burning would be 250,000 acres, and Alternative E has a projected program of 180,000 average annual acres of burning. The impacts of prescribed fire on soils are expected to stay within established limits for all alternatives. All prescribed burns are expected to be of light to moderate severity, with many of them conducted during the dormant season.

Effects of Herbicide Use on Soils

Herbicides do not physically disturb the soil; therefore, treated areas would have intact litter and duff. Herbicides could affect soil productivity through biotic impacts, soil erosion, and nutrient leaching (FEIS Vegetation Management, 1990, IV-95 through IV-96). Depending on the application rate and soil environment, herbicides can stimulate or inhibit soil organisms. Adverse effects can occur when herbicides are applied at higher rates than the label rate. Use of herbicides at the lowest effective rate required by mitigation measures does not reduce activity of soil biota (Fletcher and Friedman 1986). Litter and duff serve to minimize erosion and nutrient loss from leaching. Forest standards have been developed to ensure that herbicides are applied correctly and pose no greater than minimal risk to soils and soils biota and do not accidentally contaminate surface waters. No herbicide will be mixed or used within 100 feet of perennial streams, lakes, or ponds, or within 30 feet of other streams with defined channels. Herbicides, carefully directed and foliar sprayed during late spring to summer at the minimum recommended application rate, should result in no detrimental effects to long-term soil productivity or impact water quality. With plan standards in effect, all alternatives show acceptably low risk with respect to potential herbicide use.

Other Effects on Soils

The 1990 Forest Plan identified about 200 acres of eroding lands in need of restoration and estimated that if watershed improvement work was sustained at a rate of 10 acres per year, then this backlog of lands would be completed by the year 2010. Under current management, the entire 1990 backlog of 200 acres has been accomplished. Nonetheless, abandoned roads and trails and abandoned gravel pits and surface mines continue to contribute to soil displacement, compaction, and erosion. Also, there are additional acres in need of restoration from newly acquired lands, unauthorized OHV trails, as a result of wildfire, and from PL-566 flood control dams, and other special use areas.

On average, the Forest accomplishes 30 to 40 acres/year of watershed restoration (from all the above). This number is not expected to diminish during the next planning period. Rather, more acres may be restored in the future (such as compaction mitigation) if, during project implementation using Forest Plan soil standards, areas are found that exceed the specified tolerances.

Recreational activities, in general, are less disruptive to soils than typical vegetation management activities; however, both horses and motorized vehicles in the Forest have the potential to rut and compact soils. Alternatives B through D would make cross-country travel by motorized vehicles unsuitable and include an objective to "designate and sign a system of roads and trails suitable for public access by motor vehicle, including, where appropriate off-highway vehicles, no later than October 2009." Allowing OHVs only on designated routes will relocate OHV use to areas better suited for this activity and will allow previously unauthorized user-defined trails to be reclaimed.

About 114,537 acres in Oklahoma and 161,278 acres in Arkansas are considered suitable for livestock grazing under all alternatives; therefore, there are no differences among alternatives in terms of impacts to soil when grazing is considered. Because demand for Forest grazing has been decreasing since 1975, it is expected to continue to decline during the planning period.

Extraction of locatable or leasable minerals directly affects soils by removing vegetation and often the entire soil overlayment. Possible effects include erosion and loss of soil productivity. The Forest requires mineral sites to be restored when use ends.

The most common causes of accelerated erosion are the creation and use of forest roads and the use of heavy equipment associated with timber harvest because construction, maintenance, and use of temporary and permanent roads have the potential to disrupt natural drainage patterns and disturb soils. Continual use of roads leads to soil compaction and, during wet seasons, to rutting. The Forest has a policy of decreasing the open road density where feasible. In comparing alternatives, Alternative C has the highest level of management activity and is therefore considered to be the alternative that would have the greatest impacts to soils. Alternative A, because of fewer management activities, is considered to be the alternative with the least impact to soils. Further comparison of alternatives and information from the Forest Roads Analysis indicates that for Maintenance Level (ML) 3, 4, and 5 roads, only a few miles of new ML 3, 4, or 5 roads or road segments are likely to be constructed over the next 10 to 15 years, and virtually all existing ML 3, 4, 5 roads are likely to remain open, regardless of alternative. Therefore, there are no differences among the alternatives considered in detail for ML 3, 4, and 5 roads. Changes to ML 1 and 2 roads will be addressed by environmental analyses at the project level. Except for relatively minor differences among alternatives in acres managed as wilderness or recommended wilderness, the number of ML 1 and 2 roads and their effects on soil would change only slightly by alternative.

Cumulative Effects

Maintenance or lack of maintenance of roads could contribute to long-term cumulative effects. Road maintenance budgets have been inadequate to keep roads fully maintained. Soil impacts from heavy equipment used during logging operations will continue; however, with proper design of temporary roads and log landings, such use should be properly mitigated.

Cumulatively, environmental consequences to soils from past, present, and foreseeable management, mining, grazing, or recreational activities will be minimized through project level analysis, prescription of appropriate mitigation and adherence to Design Criteria.

Research indicates that soil productivity is sustained through nitrogen and carbon fixation, mineral release from weathering parent material, decaying organic matter, and translocation of nutrients. Erosion, compaction, and displacement can affect long-term and short-term soil productivity. Loss of soil nutrients can occur directly from soil erosion and soil displacement, or indirectly by biomass removal from harvesting timber or from fire. Biomass removal in the form of timber harvest can result in nutrient deficits. Nutrient depletion; however, is generally only a concern where soils are initially nutrient poor, where whole-tree harvest (total biomass removal) is used, or where stand rotations are short, i.e., on the order of 20-35 years (Jorgenson and Wells 1986).

Monitoring and research studies on the Ouachita National Forest have not detected differences in soil nutrient status in stands managed under different intensities, suggesting that cumulative effects on nutrient levels are not substantial even under the most intensive management regimes (Ku and Lawson 1993). Beasley and others (1987) studying soil nutrient levels of undisturbed and managed timber stands on the Ouachita National Forest, found that nutrient losses on disturbed soils quickly returned to control levels, generally by the second year after treatment. They concluded that any net loss of nutrients from forest management actions was soon replaced through atmospheric deposition of nutrients, which equaled or exceeded any losses. Additionally, general field observation and expert opinion do not support the notion that typical management actions, such as those that would be implemented under each alternative, negatively affect soil productivity on the Ouachita National Forest (Wheeler and Eichman 1991).

Aquatic Habitat and Species

Aquatic Resources

The following sections describe the physical environment of the aquatic resources found in and around the Ouachita National Forest. Additional detailed descriptions of the water environment including physical, chemical, and biological information may be found in the Ozark-Ouachita Highlands Assessment, Aquatic Report (1999).

Hydrologic Unit Codes

A watershed is a region or area bounded peripherally by a divide and draining ultimately to a particular watercourse or body of water. For purposes of planning, the forest uses areas defined by Hydrologic Unit Codes (HUC) as watersheds.

Watersheds are delineated within a hierarchical framework. For example, each of the major river basins or regions (1st level) is subdivided into smaller and smaller basins called, in descending order, sub-regions (2nd level), accounting units (3rd level), cataloging units (4th level) and then watersheds (5th level). To help readers locate 5th level watersheds and avoid the confusion of 10-digit codes, the 5th level watersheds have been named. Whenever possible, the name was taken

from a local stream or lake feature. See Appendix C for a list of hydrologic units and an explanation of how HUCs are numbered. Across the Forest, there are thirteen 4th level cataloging units. Figure 3.7 displays the 4th level cataloging units and Ouachita National Forest surface ownership.



Figure 3.7 Fourth level cataloging units and lands managed by the Ouachita National Forest.

Figure 3.8 shows the 5th level watersheds (subdivisions of 4th level cataloging units) that contain lands managed by the Ouachita National Forest. There are 50 5th level watersheds that are potentially affected by management of the Forest.



Figure 3.8 Fifth level watersheds within 4th level cataloging units

Rivers

Ten major rivers originate (totally or in part) from the Ouachita Mountains. From the southern portion of the Ouachita Mountains, the Ouachita, Caddo, and Little Missouri Rivers contribute to the Red River. From the northern side, the Poteau, Petit Jean, and Fourche La Pave Rivers flow into the Arkansas River. The western headwaters of the Ouachita Mountains contribute to the Glover, Kiamichi, Mountain Fork, and Cossatot Rivers. According to the National Hydrography Data (1:24,000), over 22,546 miles of perennial streams occur within watersheds and over 5,675 miles flow within lands managed by the Ouachita National Forest.

Lakes

National Hydrography Data show that about 25,000 lakes and ponds covering 110,682 acres are found within the 5th level watersheds that include the Ouachita National Forest. Within the Forest itself, there are 409 lakes covering about 60,000 water surface acres, the largest lakes and ponds within the 5th level watersheds are shown (water surface acres) in the following tabulation:

Lake Ouachita, AR	38,182
Broken Bow Lake, OK	14,217
Lake Maumelle, AR	8,960
Lake Greeson, AR	7,054
Lake Hamilton, AR	6,663
Wister Reservoir, OK	3,908
Blue Mountain Lake, AR	2,972
Nimrod Lake, AR	2,841
Spur Lake, AR	2,829
Harris Brake Lake, AR	1,260
Lake Winona, AR	1,170
Lake Hinkle, AR	969
Ward Lake, OK	374

(acres calculated from GIS coverages)

Watershed Condition and Vulnerability

Watershed condition and vulnerability were determined through a forest-wide watershed assessment (US Forest Service 2004). Fifteen factors (eight condition and seven vulnerability factors) affecting watershed condition or watershed vulnerability were addressed and ranked on 5th level watersheds across the Forest. Lake Hamilton watershed has the lowest overall score, based on road crossings, point sources, population, road density, and drinking water sources. Riddle Creek, Irons Fork Middle Fork, Headwaters of the Poteau, Lower Little River, and Little Mazarn also have low overall watershed values.

Figure 3.9 displays overall condition plotted against overall vulnerability. Lower values are indicative of greater vulnerability or poorer condition while higher values have lower vulnerability or better condition. Watersheds above the dark line are watersheds with lower vulnerabilities and better condition when compared to watersheds between the lines. Watersheds below the lighter line are in poorer condition and have higher vulnerabilities when compared to watersheds between the lines.

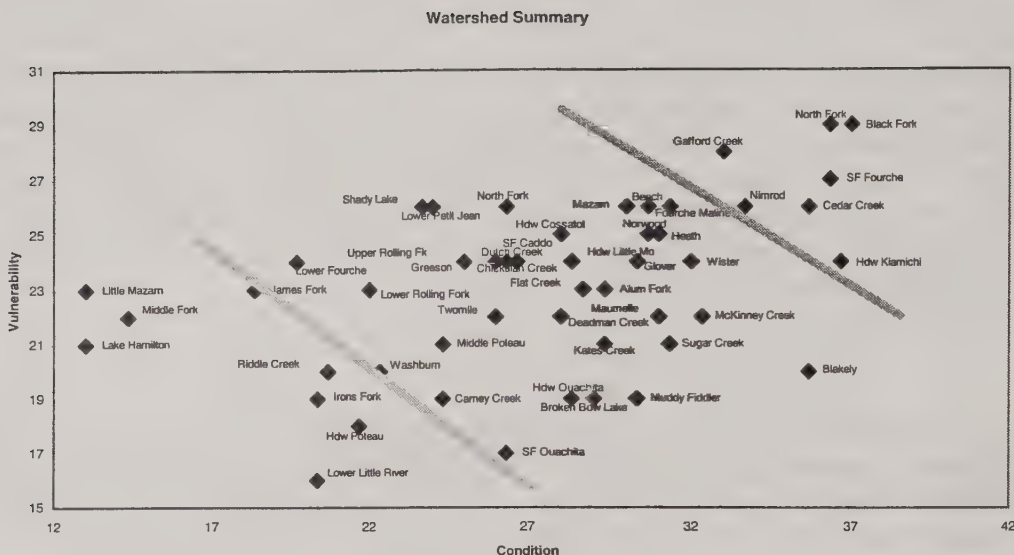


Figure 3.9 Watershed summary using vulnerability and condition

The principal objective of the forest-wide watershed analysis was to provide an assessment of watershed health for the forest plan. Summary conclusions drawn from the analysis include:

- Scores represent a comparative ranking and are limited to the 50 watersheds studied. A lower score does not mean that the watershed is impaired, only that compared to the other 50 that include National Forest System lands, it has a lower comparative ranking
- Watersheds with lower condition and vulnerability scores tend to have a lower percentage of lands managed as part of the National Forest
- Higher road density, which is a vulnerability factor, tends to occur in more populated areas; however, higher road densities within riparian areas are found in less populated areas with a greater National Forest influence. This is likely due to a tendency in decades past to locate roads within riparian areas
- The watersheds with a high percentage of lands managed as part of the National Forest serve as a refuge for many aquatic species of concern

Water Uses

Water on the Ouachita National Forest is needed for recreation (primary contact such as swimming and secondary contact such as fishing and boating), wildlife, fisheries, public and domestic uses, livestock watering, and administrative use. Additionally, instream flow quantities and timing are necessary to maintain the capacity of the channels to transport water and sediment and for fisheries, recreation, and visual quality.

Surface Water

For planning purposes, consumptive and non-consumptive water uses were determined for counties associated with 5th level watersheds. Since the 1999 Ozark-Ouachita Highlands Assessment, additional data have become available. Tables 3.7 and 3.8 display the consumptive and non-consumptive surface withdrawals by county for 1995 and 2000, respectively.

Thermoelectric and public water supplies comprise 85 percent and 11 percent, respectively, of the surface-water use. Overall, surface water use increased by approximately 11 percent from 1995 to 2000, with most of the demand in thermoelectric use.

Table 3.7 Surface-water Use (Million Gallons per Day), 1995

County	State	Public Supply	Commercial	Domestic	Industrial	Thermo-electric	Mining	Livestock	Irrigation	Total
Clark	AR	2.83	0.00	0.00	0.00	0.00	0.00	0.20	0.96	3.99
Conway	AR	1.32	0.04	0.00	20.54	0.00	0.00	1.29	3.88	27.07
Faulkner	AR	7.16	0.00	0.00	0.00	0.00	0.00	0.56	0.28	8.00
Franklin	AR	2.97	0.07	0.00	0.00	8.03	0.00	0.53	0.01	11.61
Garland	AR	14.53	0.00	0.00	2.41	247.15	0.00	0.66	0.01	264.76
Hot Spring	AR	3.19	0.05	0.00	0.44	0.00	0.00	0.18	3.67	7.53
Howard	AR	3.44	0.00	0.00	1.14	0.00	0.00	00.5	0.00	5.08
Little River	AR	0.00	0.00	0.00	0.00	0.00	0.00	0.35	2.81	3.16
Logan	AR	2.75	0.00	0.00	0.00	0.00	0.00	0.64	0.00	3.39
Montgomery	AR	0.67	0.00	0.00	0.02	0.00	0.00	0.25	0.04	0.98
Perry	AR	0.61	0.00	0.00	0.00	0.00	0.00	0.22	2.98	3.81
Pike	AR	0.71	0.00	0.00	0.00	0.00	0.00	0.30	0.00	1.01
Polk	AR	3.18	0.00	0.00	0.00	0.00	0.00	0.41	0.23	3.82
Pope	AR	8.95	0.22	0.00	0.00	967.12	0.00	0.55	0.13	976.97
Pulaski	AR	57.73	0.00	0.00	0.00	0.00	0.00	0.14	9.85	67.72
Saline	AR	4.77	0.00	0.00	0.60	0.00	0.12	0.17	0.07	5.73
Scott	AR	1.34	0.00	0.00	0.00	0.00	0.00	0.42	0.00	1.76
Sebastian	AR	31.52	0.00	0.00	0.00	0.00	0.00	0.31	0.11	31.94
Sevier	AR	2.5	0.00	0.00	0.00	0.00	0.00	0.55	0.00	3.05
Yell	AR	2.29	2.68	0.00	0.00	0.00	0.00	0.61	1.83	7.41
Latimer	OK	1.13	0.00	0.00	0.00	0.00	0.00	0.80	0.17	2.10
LeFlore	OK	8.81	0.00	0.00	0.00	0.00	0.00	2.47	0.66	11.94
McCurtain	OK	7.21	0.00	0.00	0.00	0.00	0.00	2.55	0.07	9.83
Pushmataha	OK	0.76	0.14	0.00	0.00	0.00	0.00	1.09	0.22	2.21
Total		170.37	3.20	0.00	25.15	1,222.30	0.12	15.75	27.98	1,464.87

Table 3.8 Surface-water Use (Million Gallons per Day), 2000¹

County	State	Public Supply	Domestic	Industrial	Thermo-electric	Mining	Livestock ²	Irrigation	Total
Clark	AR	2.56	0.00	0.01	0.00	0.00	0.00	0.60	3.17
Conway	AR	1.74	0.00	7.82	0.00	0.00	0.00	4.71	14.27
Faulkner	AR	8.45	0.00	0.00	0.00	0.02	0.00	2.99	11.46
Franklin	AR	2.71	0.00	0.00	0.00	0.00	0.00	0.01	2.72
Garland	AR	13.40	0.00	2.28	0.00	0.00	0.00	0.60	16.28
Hot Spring	AR	2.19	0.00	0.02	408.73	0.02	0.00	3.38	414.34
Howard	AR	4.94	0.00	1.00	0.00	0.47	0.00	0.00	6.41
Little River	AR	0.82	0.00	1.31	0.00	0.00	0.03	0.62	2.78
Logan	AR	3.33	0.00	0.00	0.00	0.00	0.00	0.11	3.44
Montgomery	AR	0.34	0.00	0.00	0.00	0.00	0.00	0.05	0.39
Perry	AR	0.72	0.00	0.00	0.00	0.00	0.00	4.76	5.48
Pike	AR	1.64	0.00	0.00	0.00	0.03	0.00	0.01	1.68
Polk	AR	1.71	0.00	0.00	0.00	0.00	0.00	0.25	1.96
Pope	AR	12.21	0.00	0.00	984.60	0.00	0.00	0.15	996.96
Pulaski	AR	68.20	0.00	0.00	0.00	0.13	0.00	12.23	80.56
Saline	AR	9.39	0.00	0.52	0.00	0.00	0.00	0.61	10.52
Scott	AR	1.74	0.00	0.00	0.00	0.00	0.00	0.00	1.74
Sebastian	AR	29.90	0.00	0.00	0.00	0.00	0.00	0.19	30.09
Sevier	AR	2.63	0.00	0.03	0.00	0.00	0.00	0.00	2.66
Yell	AR	2.91	0.00	0.00	0.00	0.00	0.00	0.81	3.72
Latimer	OK	1.14	0.00	0.00	0.00	0.00	0.92	0.04	2.10
LeFlore	OK	10.39	0.00	0.00	0.00	0.00	3.01	2.81	16.21
McCurtain	OK	5.49	0.00	0.94	0.00	0.00	2.68	0.56	9.67
Pushmataha	OK	1.36	0.00	0.00	0.00	0.00	0.91	0.39	2.66
Total		189.91	0.00	13.93	1,393.33	0.67	7.55	35.88	1,641.27
Difference 2000-1995		19.54	0.00	-11.22	171.03	0.55	-8.20	7.90	176.40

¹ commercial use was not identified in 2000 data

² includes aquaculture

Groundwater

Groundwater in the Ouachita Mountains is localized in relatively small reservoirs rather than in widespread aquifers. Primarily, it occurs in secondary openings such as joints, fractures, and separations along bedding planes. Wells drilled into bedrock have a fair chance of producing 5 to 10 gallons per minute (gpm), with a small percentage of such wells producing water that is not potable because of high iron content. Determining locations of wells capable of producing in excess of 10 gpm is seldom feasible. If a need exists for 50 gpm or more, treated surface water would probably have to be used. In the area south of the Ouachita River, springs are important in sustaining base flow in streams during the typical June–October period of water deficit. North of the Ouachita River, a few small springs are fed from side seepage, and most do not flow during periods of water deficit.

The Cretaceous age formations on the coastal plain portions of the Forest around Idabel, Oklahoma, are low productivity aquifers. Groundwater from these formations is generally of poor quality, and yields are usually only sufficient for farmstead and stock supply. The alluvia of the Red River are the most productive ground water reservoirs. The water, although “hard,” is suitable for

industrial, municipal, and irrigation uses. A yield of several hundred gallons per minute may be expected. Springs in the coastal plain portions of the forest in this area of Oklahoma do not maintain low flow conditions during the June-October period.

Consumptive and non-consumptive water uses were determined for counties associated with 5th level watersheds. Since the 1999 Ozark-Ouachita Highlands Assessment, additional data became available for 2000. Tables 3.9 and 3.10 display the consumptive and non-consumptive ground water withdraws by county for 1995 and 2000, respectively. Irrigation, followed by water supply for public and domestic purposes, comprises 49 percent and 47 percent, respectively, of the groundwater use. Overall, groundwater use decreased by approximately 6 percent from 1995 to 2000, with most of the decrease in demand in domestic and livestock use.

Table 3.9 Groundwater Use (Million Gallons per Day), 1995

County	State	Public Supply	Commercial	Domestic	Industrial	Thermo-electric	Mining	Saline mining	Livestock	Irrigation	Total
Clark	AR	0.21	0.00	0.29	0.54	0.00	0.00	0.00	0.13	0.00	1.17
Conway	AR	0.24	0.00	0.23	0.00	0.00	0.00	0.00	0.33	0.00	1.47
Faulkner	AR	1.30	0.00	1.88	0.00	0.00	0.00	0.00	0.37	0.00	3.90
Franklin	AR	0.00	0.00	0.32	0.00	0.20	0.00	0.00	0.36	0.00	0.95
Garland	AR	0.00	0.01	1.28	0.00	0.00	0.00	0.00	0.10	0.00	1.52
Hot Spring	AR	0.00	0.01	0.30	0.14	0.00	0.00	0.00	0.12	0.00	0.57
Howard	AR	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.34	0.00	0.77
Little River	AR	1.05	0.00	0.60	0.00	0.00	0.00	0.00	0.23	0.00	1.88
Logan	AR	0.00	0.00	0.73	0.00	0.00	0.00	0.00	0.43	0.37	1.53
Montgomery	AR	0.00	0.00	0.51	0.00	0.00	0.00	0.00	0.17	0.00	0.68
Perry	AR	0.09	0.00	0.33	0.00	0.00	0.00	0.00	0.15	0.00	0.57
Pike	AR	0.10	0.00	0.55	0.00	0.00	0.00	0.00	0.20	0.00	0.86
Polk	AR	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.28	0.00	1.04
Pope	AR	0.00	0.00	1.77	0.00	0.00	0.00	0.00	0.37	1.09	3.33
Pulaski	AR	3.74	0.00	0.71	0.00	0.00	0.00	0.00	0.57	13.52	18.54
Saline	AR	1.62	0.00	2.26	0.00	0.00	0.00	0.00	0.08	0.00	3.96
Scott	AR	0.00	0.00	0.70	0.00	0.00	0.00	0.00	0.28	0.00	0.98
Sebastian	AR	0.00	0.00	0.22	0.00	0.00	0.00	0.00	0.21	0.00	0.43
Sevier	AR	0.25	0.00	0.70	0.00	0.00	0.00	0.00	0.37	0.00	1.32
Yell	AR	1.47	0.00	0.41	0.00	0.00	0.00	0.00	0.41	0.00	2.29
Latimer	OK	0.00	0.00	0.02	0.00	0.00	0.00	0.15	0.09	0.00	0.26
LeFlore	OK	0.00	0.00	1.07	0.00	0.00	0.00	0.01	0.28	0.79	2.31
McCurtain	OK	0.00	0.00	1.15	0.00	0.00	0.00	0.00	0.28	0.00	1.47
Pushmataha	OK	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.12	0.00	0.44
Total		10.60	0.13	17.34	0.68	0.20	0.00	0.16	6.27	16.86	52.24

Table 3.10 Groundwater Use (Million Gallons per Day), 2000¹

County	State	Public Supply	Domestic	Industrial	Thermo-electric	Mining	Saline mining	Livestock ²	Irrigation	Total
Clark	AR	0.06	0.11	0.23	0.00	0.00	0.00	0.00	0.00	0.40
Conway	AR	0.00	0.50	0.00	0.00	0.02	0.00	0.00	1.30	1.82
Faulkner	AR	0.16	0.48	0.00	0.00	0.00	0.00	0.00	0.73	1.37
Franklin	AR	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.04
Garland	AR	0.19	0.78	0.03	0.00	0.00	0.00	0.00	0.00	1.00
Hot Spring	AR	0.00	0.52	0.01	0.00	0.00	0.00	0.00	0.00	0.53
Howard	AR	0.13	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.35
Little River	AR	0.65	0.53	0.24	0.00	0.00	0.00	0.01	0.00	1.43
Logan	AR	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.23	1.01
Montgomery	AR	0.30	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.72
Perry	AR	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.58
Pike	AR	0.05	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.45
Polk	AR	0.01	0.66	0.00	0.00	0.00	0.00	0.00	0.00	0.67
Pope	AR	0.00	1.20	0.00	0.00	0.00	0.00	0.00	0.87	2.07
Pulaski	AR	4.97	0.98	0.00	0.00	0.00	0.00	0.17	20.43	26.55
Saline	AR	1.65	1.59	0.00	0.00	0.00	0.00	0.00	0.03	3.27
Scott	AR	0.00	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.59
Sebastian	AR	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.10
Sevier	AR	1.30	0.60	0.00	0.00	0.00	0.00	0.00	0.01	1.91
Yell	AR	0.20	0.52	0.02	0.00	0.00	0.00	0.00	0.00	0.74
Latimer	OK	0.00	0.00	0.00	0.00	0.00	0.09	0.10	0.00	0.19
LeFlore	OK	0.17	0.68	0.00	0.00	0.00	0.03	0.35	0.66	1.89
McCurtain	OK	0.00	0.84	0.05	0.00	0.00	0.00	0.30	0.00	1.19
Pushmataha	OK	0.02	0.18	0.00	0.00	0.00	0.00	0.09	0.00	0.29
Total		9.86	13.26	0.58	0.04	0.02	0.12	1.02	24.26	49.16
Difference 2000-1995		-0.74	-4.08	-0.10	-0.16	0.02	-0.04	-5.25	7.40	-3.08

¹ commercial use was not identified in 2000 data

² includes aquaculture

Future Demands

The Ozark-Ouachita Highlands Assessment Aquatic Report (1999) found the following conclusions for future uses within the Ozark-Ouachita Highlands Assessment Area:

Domestic and public withdrawals are projected to increase from 143 gallons per person per day in 1995 to 156 gallons per person per day in 2040. Total domestic and public withdrawals are thus projected to increase from 538 million gallons per day (mgd) in 1995 to 675 mgd in 2040.

Total industrial and commercial withdrawals are projected to drop from 339 mgd in 1995 to 214 mgd in 2040.

Total annual energy production at thermoelectric plants in the Assessment Area is projected to increase from 75 billion kilowatt hours (kWh) in 1995 to 107 billion kWh in 2040.

Total withdrawals for thermoelectric plants are projected to drop from 4.2 billion gallons per day (mmgd) in 1995 to 3.8 mmgd in 2040.

Acres of crops irrigated are expected to increase from 798 thousand in 1995 to 1,226 thousand in 2040. Total irrigation withdrawals are projected to increase from 1.3 mmgd in 1995 to 2.0 mmgd in 2040.

Total withdrawals are projected to increase until 2020 and remain rather stable after that, staying within 5 percent of 1995 withdrawals. Essentially the increases in withdrawals for domestic and public use and for irrigation are largely balanced by the decreases in withdrawals for industrial, commercial, and thermoelectric uses.

Instream Flows

Arkansas is a "Riparian Doctrine" State. Water rights are acquired when the riparian land is acquired unless the instrument of conveyance limits or restricts the riparian rights. Riparian doctrine assures right to increase flow requirements and not instream flows themselves, since flows are dependent upon climate, geology, vegetation, and management of the land. Oklahoma is an "Appropriated Right" State, meaning water rights and ground water permits are issued by the State.

Instream flow needs for recreation, fish habitat, and other uses have not been quantified and remain to be determined. Nothing indicates that on-Forest demand for water would increase significantly under any alternative. The primary impact will be the construction of waterholes for range and wildlife use. Use of instream flows by wildlife and grazing animals should not increase significantly. Instream flow requirements for fisheries and for fire and suppression will require determination.

Source Waters

As part of the 1998 Clean Water Action Plan, each state identified source waters that are the contributing areas above municipal or public water sources. These areas are generally separated into ground waters and surface waters. Forty-seven surface sources that intersect National Forest System lands are found in Arkansas, and one is found in Oklahoma. Sixty-two Arkansas wells and springs and six Oklahoma wells fall within the influence of lands managed by the Ouachita National Forest. Figure 3.10 identifies the approximate locations of source waters on or near the Ouachita National Forest.

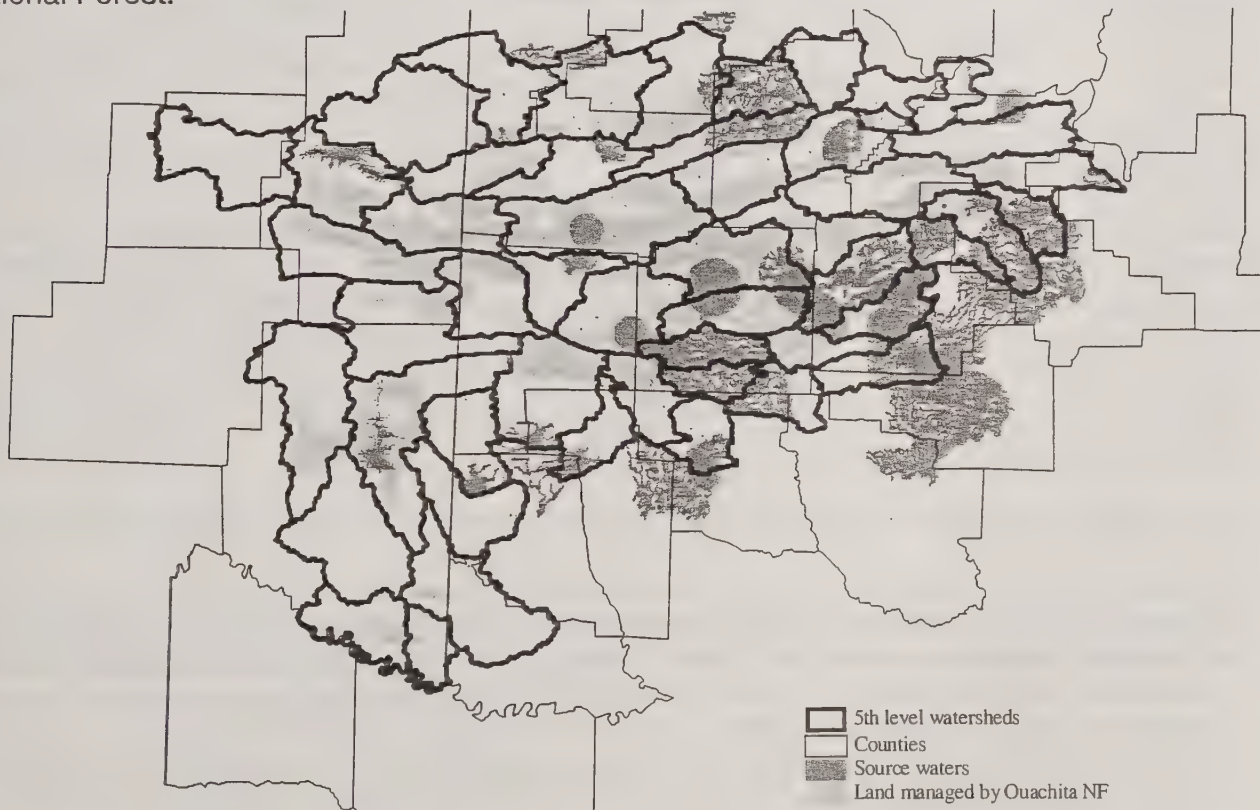


Figure 3.10 Approximate Locations of Source Waters on or near the Ouachita National Forest

Water Quality

Impaired Waters

Section 303(d) of the Clean Water Act requires states to prepare a list of impaired surface waters and to develop a priority ranking for the determination of total maximum daily loads (TMDLs).

In the 5th level watersheds that have National Forest System lands in Oklahoma, over 205 miles of lake shoreline and 247 miles of stream were listed as impaired in the 2002 Section 303(d) report. Of those impairments, 2 miles of lake shoreline and 28 miles of stream occur on National Forest System lands.

In the 5th level watersheds that have National Forest System lands in Arkansas, 28 miles of stream were listed as impaired in the 2002 303(d) report. Of those impairments, 0.2 miles of stream occur on National Forest System lands.

Table 3.11 lists impaired waters on lands managed by the National Forest, the beneficial use impacted, factors leading to listing, and cause.

Table 3.11 Impaired Waters

Stream or Lake	State	Beneficial Use Impacted	Factors Leading to Listing	Cause
Cedar Lake	OK	Warm water aquatic communities	Dissolved oxygen, pH	Unknown
Little River	OK	Cool water aquatic communities	Dissolved oxygen, turbidity, and zinc	Unknown
Little River, Mountain Fork, below Broken Bow Lake	OK	Trout, primary recreation contact	Lead and pathogens	Unknown
Little River, Mountain Fork	OK	Cool water aquatic communities	Lead, pH, and turbidity	Unknown
Glover River	OK	Cool water aquatic communities, primary recreation contact	Lead, dissolved oxygen, and pathogens	Unknown
Kiamichi River	OK	Warm water aquatic communities	Lead and pH	Unknown
Fourche La Fave River	AR	Fish Consumption	Mercury	Mercury

Extraordinary Waters

Outstanding Resource Waters (ORWs) serve as “baselines” against which other waters within the same ecoregion may be compared. These waters include extraordinary (state determined), ecologically sensitive (state determined), and legislatively designated (state or federally designated) streams and lakes. Extraordinary waters are those recognized by the state as having exceptional combinations of physical, chemical, and biological characteristics that sustain healthy aquatic habitats. Ecologically sensitive waters provide habitat for threatened, endangered, or endemic aquatic or semi-aquatic species. Legislatively designated waters in the Assessment Area include the National Wild and Scenic River System and state scenic river systems.

Within the framework of the Clean Water Act (CWA), each State designates its own ORWs and develops an antidegradation policy that stipulates that designated uses of a water body (e.g., public water supply and recreation) cannot be impaired to allow greater discharge of pollutants into that water body. The CWA prohibits any lowering of existing water quality in ORWs.

Approximately 901 miles of Extraordinary Streams or shoreline occur within the 5th level watersheds surrounding the National Forest, and 110 miles occur on the Forest. Figure 3.11 shows the locations of Extraordinary Waters.

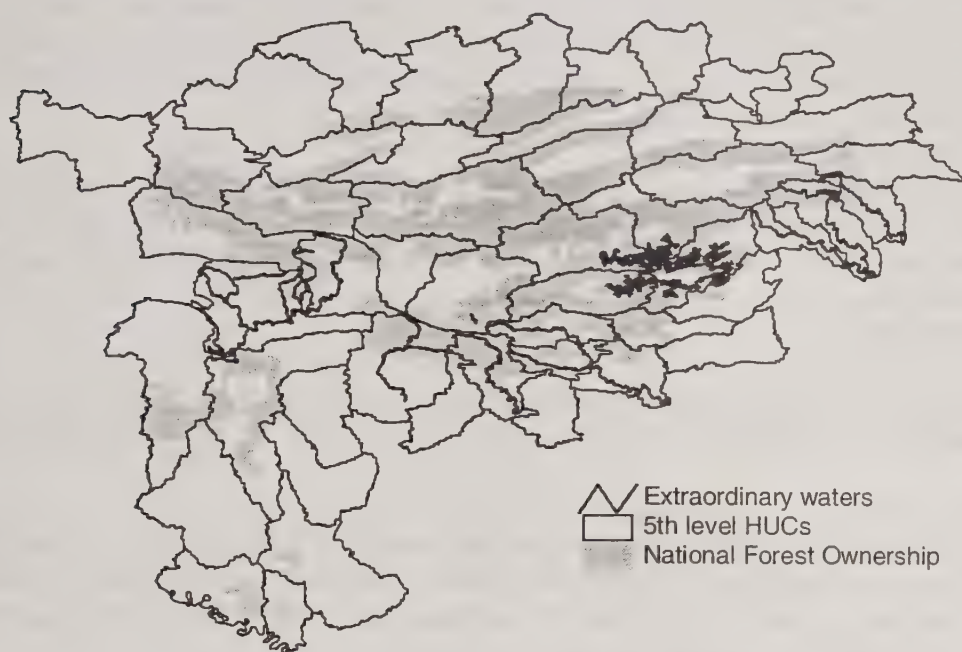


Figure 3.11 Extraordinary Waters

Non-point Source Pollution Management

The 1987 Amendments to the Clean Water Act (PL100-4) and the National Forest Management Act set forth goals for managing water quality. EPA developed Non-point Source Controls and Water Quality Standards Guidance (August 19, 1987), which provides guidance for state non-point source management programs. The Forest Service developed a non-point source strategy, which incorporates provisions of the Clean Water Act, the National Forest Management Act, and EPA guidance. Appendix C explains how these Acts and guidance are to be implemented under this Forest Plan.

Environmental Consequences for Water Quality and Associated Beneficial Uses

Management activities have the potential to affect water quality. These effects can be categorized as direct, indirect, or cumulative effects. Any activity that disturbs the land surface, decreases cover, or alters vegetation can affect water quality. The primary Forest Service management activities that could affect water quality are:

- Road construction, reconstruction, and maintenance
- Timber and wildlife management
- Fuel reduction burns
- Fireline construction and reconstruction
- Recreational OHV use

Direct and Indirect Effects

Changes in water quality as a result of road type, location, surface, maintenance, and use are well documented in the Ouachita Mountains (Miller, Beasley and Covert 1985; Swift 1985; Vowell 1985). Forest standards (Best Management Practices) and Forest Service Manual and Handbook guidance are designed to minimize the effects of road construction, maintenance and use on water quality. Forest effectiveness monitoring has demonstrated that road and temporary road crossings, (Clingenpeel, 1990, Neihardt 1994, and Vestal, 2000) do not have significant adverse effects on water quality parameters or channel substrates.

Forest monitoring has shown that unrestricted OHV use has adverse effects on water quality and associated beneficial uses. Unrestricted use in the late 1990s resulted in many user-defined trails and high use levels that caused decreases in pool depth and pool volume and increased percent fines and embeddedness. Trail closure and aggressive restoration resulted in watershed recovery in 2002 (Clingenpeel 2002).

Forest monitoring has also demonstrated that harvesting and stand improvement activities (with stream buffers maintained) did not have significant effects on water quality (Clingenpeel 1989).

Van Lear and others (1985) examined soil and nutrient export in ephemeral streamflow after three low-intensity prescribed fires prior to harvest in the Upper Piedmont of South Carolina. Minor increases in stormflow and sediment concentrations in the water were identified after low-intensity prescribed fires. It was suggested that erosion and sedimentation from plowed fire lines accounted for the majority of sediment from all watersheds.

The introduction of herbicides into the water is treated as an indirect effect because standards do not permit direct application. Herbicide monitoring across the Forest has detected only trace amounts of herbicide in streams (Ouachita National Forest 1993).

The effect of nutrients released to streams as a result of management activities is an indirect effect. Beasley, Miller, and Lawson (1987) showed a statistically significant increase in nutrient concentrations of orthophosphorus, potassium, and calcium for only the first year after clearcutting. There was no effect from selection harvesting. Because of the short period of increases (one year) and the dilution of untreated areas, there is no significant impact to water quality from the primary management activities listed previously.

While it is not possible to eliminate all soil from entering a stream, it is possible to limit and prevent soil from directly entering streams through the design and implementation of Best Management Practices (BMPs). Within the Forest Plan, standards serve as Forest BMPs. Based on the results of research and monitoring and the consistent implementation of BMPs, an adverse direct or indirect effect resulting from proposed management actions is unlikely, regardless of alternative.

Cumulative Effects

In 1990, the Forest began a long-term monitoring effort to determine cumulative effects from silvicultural activities using paired watersheds and Basin Area Stream Survey methods (Clingenpeel and Cochran 1992). Based on an examination of all physical, chemical, and biological characteristics, no single factor was indicative of adverse cumulative effects from management activities (Ouachita National Forest 1994).

In addition, the Forest has developed a process to estimate sediment yields and analyze the cumulative effects of proposed management actions on water quality. The process provides an

objective method to systematically evaluate water quality conditions for watersheds within the planning area. The process also provides data that can aid in aquatic viability analysis at the community scale (Clingenpeel and Leftwich 2004).

The process builds upon the East-Wide Watershed Assessment Process and provides for modifications based on local information. Interpretation of analysis results strives to describe objectives rather than “constraints” and provides the Forest an opportunity to identify and focus on the highest priorities for watershed improvement.

Sediment is an appropriate measure to determine the effects of management activities on water quality and its associated beneficial uses on forested lands (Coats and Miller 1981). Sediment increases can adversely affect fish productivity and diversity (Alexander and Hansen 1986), degrade drinking water, and affect recreational values.

There may be other factors such as increases in water yield or nutrient loading that could be used in the cumulative effects analysis. However, water yield models do not characterize impacts of management activities such as road construction. Changes in nutrients within streams as a result of management activities are minor (Beasley, Miller, and Lawson 1987) and therefore, not appropriate at the forest level cumulative effects analysis.

Miller, Beasley, and Lawson (1986) identified that peak flows and increases in water yield were not significant for large storm events as a result of vegetation management. Increases in summer base flows were identified for one to three years after harvest.

Changes in land use and disturbance have been modeled with respect to estimated increases in sediment, and predicted impacts are summarized by alternative. The significance of predicted impacts is related to criteria designed to determine levels of watershed health, as described later.

A valid cumulative effects analysis must be bounded in space and time. For the purposes of this exercise, 5th level watersheds that include lands of the Ouachita National Forest are the appropriate spatial bounds and were used to assess cumulative effects. The implementation period for a forest plan is 5 to 15 years; however, the appropriate time period for the sediment model is five decades (50 years). This allows for a discussion of past, present, and future activities for public and private lands by watershed for a time period of 50 years.

The summary table of the sediment model calculates the baseline, current, and predicted sediment values for each watershed by alternative and period. To determine the potential cumulative effects of water quality and associated beneficial uses these sediment values are expressed as a percent increase over the baseline. The baseline assumes an undisturbed forest floor with no roads.

Watershed Condition Rank (WCR)

Watershed condition is expressed in three categories of risk: high, moderate, and low. These ranks do not necessarily translate into excellent or poor watershed conditions, but rather categorize the watersheds based on their relative risk in terms of predicted sediment production and aquatic viability. The following section details the outcome of the WCR with respect to the effects of forest management on aquatic biota:

Where a watershed risk level is **low**, the probability (or potential) is **low** for adverse effects on aquatic species. If the effects of forest alternatives remain within this range, there should be no adverse effect on water quality with respect to beneficial uses (fish communities). National Forest objectives would be to maintain or improve aquatic health through the implementation of standards.

Where a watershed risk level is **moderate**, the potential to adversely affect beneficial uses is **moderate**. Additional project-level conservation measures would be considered. Examples of these additional measures could include conducting watershed assessments during project planning to identify the source of the problem and monitoring prior to project implementation to establish actual health of the biota.

Where a watershed risk level is **high**, the potential to adversely affect beneficial uses is **high**. In addition to measures listed above, project level analysis and implementation would seek to maintain or restore watershed health and aquatic systems. An example would be to design project-level activities to have no net increase in sediment yields.

Risk levels and sediment increase by ecoregions is presented in the following tabulation.

Risk Level	Arkansas River Valley	Coastal Plain	Ouachita Mountains
	-----Percent Increase-----		
Low	0 to 311	0 to 3746	0 to 1347
Moderate	311 to 623	3746 to 7492	1347 to 2693
High	> 623	> 7492	> 2693

Table 3.12 presents the current and estimated sediment increases for each watershed at the end of the first 10 years of plan implementation. The baseline assumes an undisturbed forest floor with no roads. Similar estimates resulted from analyses of sediment increases in subsequent decades. Of the 50 watersheds modeled, none had changes in risk level as a result of projected management activities included in each alternative. Overall, 35 watersheds have a low risk of cumulative effects, seven have a moderate risk, and eight have a high risk of an adverse cumulative effect on aquatic resources.

Table 3.12 Current and Predicted Risk Levels for All Alternatives in the First Decade.

00 Region (1 st level) 0000 Sub-Region (2 nd level) 000000 Accounting unit (3 rd level) 00000000 Cataloging unit (4 th level) 0000000000 Watershed (5 th level)	Percent Current Sediment over Baseline	Alt A	Alt B	Alt C	Alt D	Alt E
		-----Risk Level-----				
08 Lower Mississippi Region						
0804 Lower Red – Ouachita						
080401 Upper Ouachita						
08040101 Ouachita Headwaters						
0804010101 Irons Fork	650.72	L	L	L	L	L
0804010102 Kates Creek	397.71	L	L	L	L	L
0804010103 Muddy Fiddler	456.45	L	L	L	L	L
0804010104 S. Fork of the Ouachita	500.03	L	L	L	L	L
0804010105 North Fork	601.47	L	L	L	L	L
0804010106 Blakely	321.42	L	L	L	L	L
0804010107 Lake Hamilton	659.38	L	L	L	L	L
0804010108 Mazarn	413.55	L	L	L	L	L
0804010109 Little Mazarn	1,242.76	L	L	L	L	L

00 Region (1 st level) 0000 Sub-Region (2 nd level) 000000 Accounting unit (3 rd level) 00000000 Cataloging unit (4 th level) 0000000000 Watershed (5 th level)	Percent Current Sediment over Baseline	Alt A	Alt B	Alt C	Alt D	Alt E
		-----Risk Level-----				
08 Lower Mississippi Region						
0804 Lower Red – Ouachita						
080401 Upper Ouachita						
08040102 Upper Ouachita						
0804010205 Headwaters of the Caddo	237.06	L	L	L	L	L
0804010206 Carney Creek	718.11	L	L	L	L	L
0804010207 South Fork of the Caddo	201.23	L	L	L	L	L
08 Lower Mississippi Region						
0804 Lower Red – Ouachita						
080401 Upper Ouachita						
08040103 Little Missouri						
0804010301 Hdw of the Little Mo	201.39	L	L	L	L	L
0804010302 Greeson	636.69	L	L	L	L	L
08 Lower Mississippi Region						
0804 Lower Red – Ouachita						
080402 Lower Ouachita						
08040203 Upper Saline						
0804020301 Alum Fork	673.99	L	L	L	L	L
0804020302 North Fork	487.34	L	L	L	L	L
0804020303 Middle Fork	821.72	L	L	L	L	L
11 Arkansas-White-Red Region						
1111 Lower Arkansas						
111101 Robert S. Kerr Reservoir						
11110105 Poteau						
1111010501 Hdw of the Poteau	1,466.33	M	M	M	M	M
1111010502 Black Fork	299.90	L	L	L	L	L
1111010503 Middle Poteau	563.07	L	L	L	L	L
1111010504 Fourche Maline	599.46	L	L	L	L	L
1111010505 Wister	603.36	L	L	L	L	L
1111010506 Riddle Creek	923.49	H	H	H	H	H
1111010508 James Fork	1,104.86	H	H	H	H	H
11 Arkansas-White-Red Region						
1111 -- Lower Arkansas						
111102 - Lower Arkansas-Fourche La Fave						
11110204 Petit Jean						
1111020401 Washburn	807.40	H	H	H	H	H
1111020402 Sugar Creek	431.69	M	M	M	M	M
1111020403 Deadman Creek	677.9	H	H	H	H	H
1111020404 Chickalah Creek	619.93	M	M	M	M	M
1111020405 Dutch Creek	349.64	L	L	L	L	L
1111020406 Heath	1,451.71	H	H	H	H	H
1111020407 Lower Petit Jean	1,431.72	H	H	H	H	H
11 Arkansas-White-Red Region						
1111 -- Lower Arkansas						
111102 - Lower Arkansas-Fourche La Fave						
11110206 Fourche La Fave						
1111020601 Cedar Creek	456.03	L	L	L	L	L
1111020602 Gafford Creek	542.32	L	L	L	L	L

00 Region (1 st level) 0000 Sub-Region (2 nd level) 000000 Accounting unit (3 rd level) 00000000 Cataloging unit (4 th level) 0000000000 Watershed (5 th level)	Percent Current Sediment over Baseline	Alt A	Alt B	Alt C	Alt D	Alt E
		-----Risk Level-----				
1111020603 Nimrod	827.69	L	L	L	L	L
1111020604 Lower Fourche	2,128.08	M	M	M	M	M
1111020605 S. Fork of the Fourche	525.04	L	L	L	L	L
11 Arkansas-White-Red Region						
1111 Lower Arkansas						
111102 Lower Arkansas-Fourche La Fave						
11110207 Lower Arkansas-Maumelle						
1111020702 Maumelle	478.71	L	L	L	L	L
11 Arkansas-White-Red Region						
1114 Red-Sulphur						
111401 -- Red-Little						
11140105 Kiamichi						
1114010501 Hdw of the Kiamichi	273.52	L	L	L	L	L
11 Arkansas-White-Red Region						
1114 Red-Sulphur						
111401 -- Red-Little						
11140106 Pecan-Waterhole						
1114010604 Norwood	22,714.37	H	H	H	H	H
1114010605 McKinney Creek	16,141.89	H	H	H	H	H
11 Arkansas-White-Red Region						
1114 Red-Sulphur						
111401 -- Red-Little						
11140107 Upper Little						
1114010704 Glover	1,058.96	L	L	L	L	L
1114010705 Lower Little River	5,858.30	M	M	M	M	M
11 Arkansas-White-Red Region						
1114 Red-Sulphur						
111401 -- Red-Little						
11140108 Mountain Fork						
1114010801 Twomile	431.97	L	L	L	L	L
1114010804 Beech	484.14	L	L	L	L	L
1114010805 Broken Bow Lake	506.58	L	L	L	L	L
11 Arkansas-White-Red Region						
1114 Red-Sulphur						
111401 -- Red-Little						
11140109 Lower Little						
1114010901 Flat Creek	6,492.93	M	M	M	M	M
1114010902 Upper Rolling Fork	929.18	L	L	L	L	L
1114010903 Lower Rolling Fork	2,641.61	M	M	M	M	M
1114010904 Hdw of the Cossatot	318.54	L	L	L	L	L
1114010907 Shady Lake	663.97	L	L	L	L	L

L = low, M = moderate, H = high

Hdw = Headwaters

Aquatic Communities

The 1982 implementing regulations for the National Forest Management Act of 1976 (36 CFR 219.19) require that habitat be managed to support viable populations of native and desirable non-native vertebrates within the planning area. USDA Departmental Regulation Number 9500-004 (1983) requires that habitat on National Forest System lands be managed to support viable populations of native and desired non-native plants, fish, and wildlife. These regulations focus on the role of habitat management in providing for species viability. Supporting viable populations involves ensuring that habitats are distributed in patterns and available in amounts that can support interacting populations at levels that result in persistence of the species over time. The 1982 planning regulations also require that Forest planning “provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area” (36 CFR 219.26).

Aquatic communities and habitat elements include Conservation Targets such as rivers and streams, ponds, lakes, wildlife waterholes, and seeps with minimal woody vegetation as opposed to forested seeps described in the aquatic-associated terrestrial systems. This section describes the current conditions of the aquatic communities on the Forest, the relationship of these conditions to species of viability concern and management indicator species (MIS), and the biological effects of implementing each of the five alternatives. The analysis draws upon the most current available data concerning existing natural communities; current watershed conditions; and the distribution, abundance, and habitat relationships of species of viability concern and MIS. Central to the analysis is the comprehensive Ouachita National Forest Species Viability Evaluation (2004).

Habitat condition needs for species of viability concern and MIS are based on the most current science, literature, and expert opinion. Complete literature citations (not presented here) are contained within the Species Viability Evaluation (SVE) itself, available online at www.aokforests.com or upon request. For the Ouachita National Forest SVE, each aquatic community was weighted by how important that community is to the species (on a descending scale of “obligate,” “optimal,” “suitable,” or “marginal”). Alternatives were compared on the basis of condition scores for each Conservation Target (natural aquatic community). Table 3.13 contains the viability condition scores for aquatic communities.

Table 3.13 Species Viability Condition Scores for Aquatic Communities and Habitat Elements

Range of Condition Score	Condition Classification	Definition of SVE Score Applied to Communities and Habitat Elements
3.51 – 4.0	Very Good	Community or Habitat Element conditions are optimal; associated species' populations should remain robust and potentially even expand
2.51– 3.50	Good	Community or Habitat Element conditions are acceptable; associated species' populations should remain stable
1.51 – 2.50	Fair	Community or Habitat Element conditions are slightly inadequate; although associated species' populations may persist for some time, they may be subject to gradual decline
1.0 – 1.50	Poor	Community or Habitat Element conditions are severely inadequate. Associated species' populations are expected to severely decline; localized extirpations are occurring or are imminent

Ouachita Ponds, Lakes, and Waterholes

Ponds, lakes, and waterholes consist of all lentic (impounded, or otherwise non-flowing) aquatic systems on the forest. These systems provide a water source for a wide-range of plants and animals, including nongame aquatic and sport fishing species. In addition, these waterbodies provide critical reproductive habitat for amphibians and critical foraging habitat for bald eagles. The desired conditions are protection and maintenance of water quality, site productivity, associated riparian vegetation, and habitat for dependent species.

Ponds and Lakes

Ponds and lakes generally are managed with an emphasis on recreational sport fishing. Largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*) and redear sunfish (*Lepomis microlophus*) are designated as demand management indicator species (MIS) to track the health of lake and pond communities, particularly as they relate to their ability to support a recreational fishery.

According to the FY 2004 Ouachita National Forest Annual Monitoring Report and a Summary and Analysis of Data Pertaining to Management Indicator Species (2003), the fisheries in ponds and lakes that are primarily managed by the Forest are in very good condition and the MIS populations are stable. Condition was also based on the designation and maintenance of protective buffer zones around the perimeter of these water bodies.

No species of viability concern are associated with ponds and lakes. Recreational fishing ponds and lakes do provide habitat for three Management Indicator/Demand species (MIS/Demand), as listed in the following tabulation:

Species	Importance of Ponds and Lakes
Largemouth bass (<i>Micropterus salmoides</i>) MIS/Demand Bluegill sunfish (<i>Lepomis macrochirus</i>) MIS/Demand Redear sunfish (<i>Lepomis microlophus</i>) MIS/Demand	Obligate

Wildlife Water Holes

Wildlife water holes (ponds one-quarter to one-half acre in size) are an important component of habitat for many species of terrestrial and semi-aquatic species, especially where lack of free water (seeps, streams, rivers, large impoundments) can be a critical limiting factor in full utilization of otherwise usable habitat. Ponds are used by a variety of demand wildlife species, such as deer, turkey, bear, and mourning doves that require access to water on a daily basis. Other species of wildlife, particularly amphibians (frogs, toads, and some species of salamanders), use ponds that lack fish as annual breeding sites, using ponds much as they would normally use temporary pools. For this reason, wildlife waterholes constructed in the general forest area, less than one-half acre or less in size, have not been stocked with fish or managed as part of the Forest fisheries program except occasionally at recreation or administrative sites.

The annual biomass produced by naturally reproducing populations of amphibians is a critical component of the terrestrial food chain, far exceeding the biomass available to terrestrial predator species from a small pond fishery. Wildlife waterhole sites also provide some of the same benefits that are obtained through wildlife openings, i.e., edge effects and an alternative food and cover

source. Where adequate free water is not available, wildlife waterholes are constructed at the rate of one per 160 acres to ensure adequate spatial distribution and availability to all species.

Due to the management practice of prohibiting fish stocking in wildlife waterholes, this habitat element was determined to be in very good condition to provide for amphibian reproduction sites. Condition was also based on the designation of a protective buffer zone around the perimeter of these water bodies.

Wildlife water holes provide obligate habitat for two species and optimal habitat for six species considered in the SVE.

Species	Importance of Wildlife Waterholes
Ringed Salamander (<i>Ambystoma annulatum</i>) Mole Salamander (<i>Ambystoma talpoideum</i>)	Obligate
Bird-voiced Tree Frog (<i>Hyla avivoca</i>) Strecker's Chorus Frog (<i>Pseudacris streckeri streckeri</i>) Northern Crawfish Frog (<i>Rana areolata circulosa</i>) Southeastern Myotis (<i>Myotis austroriparius</i>) Eastern Small-Footed Bat (<i>Myotis leibii</i>) Indiana Bat (<i>Myotis sodalis</i>)	Optimal

Seeps with Minimal Woody Vegetation

Seeps with minimal woody vegetation differ from Ouachita forested seeps, in that they are devoid of trees or shrubs. Burrowing crayfish species, as obligates of this habitat, actually burrow into the substrate, maintaining residence at the surface and/or subsurface water level as it fluctuates according to rainfall conditions. Amphibian species use these permanent and/or ephemeral water sources for reproduction. Additionally, certain species of birds, mammals, and reptiles also utilize seeps as water sources.

Seeps with minimal woody vegetation provide obligate habitat for three species and optimal habitat for five species considered in the Species Viability Evaluation.

Species	Importance of Seeps with Minimal Woody Vegetation
A Crayfish (<i>Fallicambarus jeanae</i>) A Crayfish (<i>Fallicambarus strawni</i>) A Crayfish (<i>Fallicambarus harpi</i>)	Obligate
Ringed Salamander (<i>Ambystoma annulatum</i>) Mole Salamander (<i>Ambystoma talpoideum</i>) Bird-voiced Tree Frog (<i>Hyla avivoca</i>) Strecker's Chorus Frog (<i>Pseudacris streckeri streckeri</i>) Northern Crawfish Frog (<i>Rana areolata circulosa</i>)	Optimal

Direct, Indirect, and Cumulative Effects

Currently, concerns for maintaining or enhancing the water quality and aquatic habitats associated with ponds and lakes (including Management Indicator Species), wildlife waterholes, forested seeps/springs, and seeps with minimal vegetation on the Forest include indirect detrimental effects from:

- Road construction, reconstruction, and maintenance
- Timber and wildlife habitat management activities
- Fireline construction/reconstruction associated with prescribed burning
- Indiscriminate recreational off-road-vehicle use
- Non-native invasive species

The previously named activities, particularly ground-disturbing activities, have the most potential for direct, indirect, and cumulative detrimental effects on individuals, as well as water quality and aquatic habitats. Direct effects could be mortality or displacement of individuals. Indirect and cumulative effects could be alteration of aquatic habitat and/or sedimentation. Under all alternatives, ponds, lakes, waterholes, seeps and springs all have Streamside Management Areas assigned as protective buffers from ground-disturbing activities within the riparian area, so cumulatively these communities would maintain a "good" or "very good" condition. Tables 3.14 and 3.15 display the viability ranks of aquatic communities after 10 and 50 years and compare that rank to the current condition. There are no changes by alternative at the 10 or 50 year periods.

Table 3.14 Viability Rank of Aquatic Communities Forest-wide after 10 Years by Alternative in Comparison to Current Condition.

Aquatic Communities	Current Condition	Alternatives				
		A	B	C	D	E
Ouachita Ponds and Lakes	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
Wildlife Waterholes	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
Seeps with Minimal Vegetation	Good	Good	Good	Good	Good	Good

Table 3.15 Viability Rank of Aquatic Communities Forest-wide after 50 Years by Alternative in Comparison to Current Condition.

Aquatic Communities	Current Condition	Alternatives				
		A	B	C	D	E
Ouachita Ponds and Lakes	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
Wildlife Waterholes	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good
Seeps with Minimal Vegetation	Good	Good	Good	Good	Good	Good

Ouachita Rivers and Streams

Affected Environment

Rivers and streams comprise the flowing-water systems on the Forest. These systems provide critical habitat for fish, mussels and other invertebrates, reptiles, and amphibians. Bird, reptile and mammal species also depend on rivers and streams for water sources, as well as foraging habitat. The desired conditions are protection and maintenance of water quality, site productivity, channel stability, riparian vegetation, and habitat for riparian-dependent species.

Smallmouth bass (*Micropterus dolomieu*) is retained as a demand MIS to track the health of river and stream communities, particularly as it relates to supporting sport fisheries. Smallmouth bass are known to be sensitive to habitat degradation and are not found to occur in less than high quality habitat. Watersheds with a high percentage of National Forest land reflect low risk to aquatic species viability across all alternatives, and smallmouth bass are considered to be secure Forest-wide in their preferred habitat of medium-sized and small upland rivers.

Ouachita Rivers and Streams provide obligate habitat for 61 species and optimal habitat for 7 aquatic, semi-aquatic, and/or terrestrial species considered in the Species Viability Evaluation (SVE) or as Management Indicator Species (MIS), including Demand species (Demand). Species with no designation are SVE only, and not MIS/Demand species. The following tabulation lists the species of concern that fit these various categories:

Species	Importance of Ouachita Rivers and Streams
A Crayfish (<i>Orconectes saxatilis</i>) A Crayfish (<i>Orconectes menae</i>) A Crayfish (<i>Procambarus reimeri</i>) A Crayfish (<i>Procambarus tenuis</i>) Ouachita Madtom (<i>Noturus lachneri</i>) Caddo Madtom (<i>Noturus taylori</i>) Peppered Shiner (<i>Notropis perpallidus</i>) Leopard Darter (<i>Percina pantherina</i>) Paleback Darter (<i>Etheostoma pallididorsum</i>) Crystal Darter (<i>Crystallaria asprella</i>) Ouachita Darter (<i>Percina</i> sp. <i>nov.</i>) Redspot Chub (<i>Nocomis asper</i>) Kiamichi Shiner (<i>Notropis ortenburgeri</i>) Goldstripe Darter (<i>Etheostoma parvipinne</i>) Longnose Darter (<i>Percina nasuta</i>) Ouachita Shiner (<i>Lythrurus snelsoni</i>) Monkeyface (<i>Quadrula metanevra</i>) Ebonyshell (<i>Fusconaia ebena</i>) Spike (<i>Elliptio dilatata</i>) Butterfly (<i>Ellipsaria lineolata</i>) Western Fanshell (<i>Cyprogenia aberti</i>) Spectaclecase Pearlymussel (<i>Cumberlandia monodonta</i>) Flat Floater (<i>Anodonta suborbiculata</i>) Pink Mucket (<i>Lampsilis abrupta</i>) Winged Mapleleaf (<i>Quadrula fragosa</i>) Arkansas Fatmucket (<i>Lampsilis powellii</i>) Elktoe (<i>Alasmidonta marginata</i>)	Obligate

Species	Importance of Ouachita Rivers and Streams
Rainbow (<i>Villosa iris</i>) Ouachita Rock Pocketbook (<i>Arkansia wheeleri</i>) Flutedshell (<i>Lasmigona costata</i>) Rabbitsfoot (<i>Quadrula cylindrica cylindrica</i>) Ouachita Kidneyshell (<i>Ptychobranhus occidentalis</i>) Pyramid Pigtoe (<i>Pleurobema rubrum</i>) Ohio Pigtoe (<i>Pleurobema cordatum</i>) Southern Hickorynut (<i>Obovaria jacksoniana</i>) Louisiana Fatmucket (<i>Lampsilis hydiana</i>) Scaleshell (<i>Leptodea leptodon</i>) Fatmucket (<i>Lampsilis siliquoidea</i>) Sandbank Pocketbook (<i>Lampsilis satura</i>) Purple Liliput (<i>Toxolasma lividus</i>) Ouachita Creekshell (<i>Villosa arkansasensis</i>) Southern Pocketbook (<i>Lampsilis ornata</i>) Black Sandshell (<i>Ligumia recta</i>) Harperella (<i>Ptilimnium nodosum</i>) A Sandgrass (<i>Calamovilfa arcuata</i>) Narrowleaf Ironweed (<i>Vernonia lettermannii</i>) Sand Grape (<i>Vitis rupestris</i>) Razorback Musk Turtle (<i>Sternotherus carinatus</i>) Smallmouth bass (<i>Micropterus dolomieu</i>) MIS/Demand Yellow bullhead (<i>Ameiurus natalis</i>) MIS Pirate perch (<i>Aphredoderus sayanus</i>) MIS Central stoneroller (<i>Campostoma anomalum</i>) MIS Green sunfish (<i>Lepomis cyanellus</i>) MIS Longear sunfish (<i>Lepomis megalotis</i>) MIS Yellow bullhead (<i>Ameiurus natalis</i>) MIS Creek chubsucker (<i>Erimyzon oblongus</i>) MIS Johnny darter (<i>Etheostoma nigrum</i>) MIS Orangebelly darter (<i>Etheostoma radiosum</i>) MIS Redfin darter (<i>Etheostoma whipplei</i>) MIS Northern studfish (<i>Fundulus catenatus</i>) MIS Northern hog sucker (<i>Hypentilium nigricans</i>) MIS Striped shiner (<i>Luxilus chrysocephalus</i>) MIS Channel darter (<i>Percina copelandi</i>) MIS	Obligate
Ouachita Dusky Salamander (<i>Desmognathus brimleyorum</i>) Many-ribbed Salamander (<i>Eurycea multiplicata multiplicata</i>) Bird-voiced Tree Frog (<i>Hyla avivoca</i>) Bald Eagle (<i>Haliaeetus leucocephalus</i>) Southeastern Myotis (<i>Myotis austroriparius</i>) Eastern Small-Footed Bat (<i>Myotis leibii</i>) Indiana Bat (<i>Myotis sodalis</i>)	Optimal

Aquatic Endangered, Threatened, Other Species of Viability Concern and Management Indicator Species (MIS)

Table 3.16 provides the federal, state, and global rankings of all aquatic species considered in the SVE. This list includes those species found both on the Forest and downstream of it (within the 5th level HUC) in the following categories:

- Species listed as Proposed, Threatened, or Endangered under the federal Endangered Species Act
- Species listed on the Region 8 Sensitive Species list
- Species identified as locally rare and of special concern by species experts

The Ouachita National Forest harbors a rich diversity of aquatic species, including 47 species of viability concern:

- 1 federally endangered plant
- 7 endemic crayfish
- 12 fish species (including 1 federally threatened and 9 endemic)
- 27 mussel species (including 4 federally endangered, 1 federally threatened, and 1 endemic)

Table 3.16 Ouachita National Forest Aquatic Species of Viability Concern

Common Name	Scientific Name	Viability Concern Classification	Endemic	State Rank (AR/OK)	Global Rank
Plant Species					
Harperella	<i>Ptilimnium nodosum</i>	Endangered	No	S2/-	G2
Crayfish Species					
A Crayfish	<i>Fallicambarus jeanae</i>	Local viability concern	Yes	S2/-	G2
A Crayfish	<i>Orconectes saxatilis</i>	Local viability concern	Yes	-/S1	G1
A Crayfish	<i>Fallicambarus strawni</i>	RF Sensitive	Yes	S1?/-	G1G2
A Crayfish	<i>Orconectes menae</i>	RF Sensitive	Yes	-/-	G3
A Crayfish	<i>Procambarus reimeri</i>	RF Sensitive	Yes	-/-	G1
A Crayfish	<i>Procambarus tenuis</i>	RF Sensitive	Yes	-/-	G3
A Crayfish	<i>Fallicambarus harpi</i>	Local viability concern	Yes	-/-	G1
Fish Species					
Ouachita Madtom	<i>Noturus lachneri</i>	RF Sensitive	Yes	S2/-	G2
Caddo Madtom	<i>Noturus taylori</i>	RF Sensitive	Yes	-/-	G1
Peppered Shiner	<i>Notropis perpallidus</i>	RF Sensitive	Yes	S2/S2S3	G3
Leopard Darter	<i>Percina pantherina</i>	Threatened	Yes	S1/S1	G1
Paleback Darter	<i>Etheostoma pallididorsum</i>	RF Sensitive	Yes	S2/-	G2
Crystal Darter	<i>Crystallaria asprella</i>	RF Sensitive	No	-/S1	G3
Ouachita Darter	<i>Percina</i> sp. nov.	Local viability concern	Yes	-/-	G2
Redspot Chub	<i>Nocomis asper</i>	Local viability concern	No	S2/-	G4
Kiamichi Shiner	<i>Notropis ortenburgeri</i>	RF Sensitive	Yes	S2/S3	G3
Goldstripe Darter	<i>Etheostoma parvipinne</i>	Local viability concern	No	-/S2	G4G5

Common Name	Scientific Name	Viability Concern Classification	Endemic	State Rank (AR/OK)	Global Rank
Longnose Darter	<i>Percina nasuta</i>	RF Sensitive	Yes	S2/S1	G3
Ouachita Shiner	<i>Lythrurus snelsoni</i>	RF Sensitive	Yes	-/S2	G3
Mussel Species					
Monkeyface	<i>Quadrula metanevra</i>	RF Sensitive	No	S3/S4, S1	G4
Ebonyshell	<i>Fusconaia ebena</i>	Local viability concern	No	-/-	G4G5
Spike	<i>Elliptio dilatata</i>	Local viability concern	No	S4/S1	G5
Butterfly	<i>Ellipsaria lineolata</i>	Local viability concern	No	S /S2	G4
Western Fanshell	<i>Cyprogenia aberti</i>	Local viability concern	No	S2/-	G2
Spectaclecase Pearlymussel	<i>Cumberlandia monodonta</i>	Local viability concern	No	S1/-	G2G3
Flat Floater	<i>Anodonta suborbiculata</i>	Local viability concern	No	S1/-	G5
Pink Mucket	<i>Lampsilis abrupta</i>	Endangered	No	S2/-	G2
Winged Mapleleaf	<i>Quadrula fragosa</i>	Endangered	No	-/-	G1
Arkansas Fatmucket	<i>Lampsilis powellii</i>	Threatened	Yes	S2/-	G1G2
Elktoe	<i>Alasmidonta marginata</i>	Local viability concern	No	S3/S1	G4
Rainbow	<i>Villosa iris</i>	Local viability concern	No	-/S1	G5
Ouachita Rock Pocketbook	<i>Arkansia wheeleri</i>	Endangered	No	S1/S1	G1
Flutedshell	<i>Lasmigona costata</i>	Local viability concern	No	S3/S1	G5
Rabbitsfoot	<i>Quadrula cylindrica cylindrica</i>	RF Sensitive	No	S2/S1	G3
Ouachita Kidneyshell	<i>Ptychobranhus occidentalis</i>	Local viability concern	No	S/S2	G3G4
Pyramid Pigtoe	<i>Pleurobema rubrum</i>	RF Sensitive	No	S2/-	G2
Ohio Pigtoe	<i>Pleurobema cordatum</i>	RF Sensitive	No	S1/S2	G3
Southern Hickorynut	<i>Obovaria jacksoniana</i>	Local viability concern	No	S2/S2	G1G2
Louisiana Fatmucket	<i>Lampsilis hydiana</i>	Local viability concern	No	S1/-	G4
Scaleshell	<i>Leptodea leptodon</i>	Endangered	No	S1/S1	G1
Fatmucket	<i>Lampsilis siliquoidea</i>	Local viability concern	No	S3/-	G5
Sandbank Pocketbook	<i>Lampsilis satura</i>	RF Sensitive	No	S2/-	G2
Purple Liliput	<i>Toxolasma lividus</i>	RF Sensitive	No	S2/-	G2
Ouachita Creekshell	<i>Villosa arkansasensis</i>	RF Sensitive	No	S2/S1S2	G2
Southern Pocketbook	<i>Lampsilis ornata</i>	Local viability concern	No	S1/-	G5
Black Sandshell	<i>Ligumia recta</i>	Local viability concern	No	S2/S1	G5

RF Sensitive = Regional Forester's Sensitive Species List

Currently, concerns for maintaining or enhancing water quality and aquatic habitats on the Forest include potential detrimental effects from:

- Road construction, reconstruction, and maintenance
- Timber and wildlife habitat management activities
- Fireline construction/reconstruction and associated prescribed burning
- Indiscriminate recreational off-road-vehicle use
- Non-native invasive species
- Dams and other barriers to passage by fish and other aquatic organisms

These activities have the most potential for detrimental effects on water quality and aquatic habitats, particularly in the Streamside Management Areas. Their effects on water quality and, by association, aquatic communities, are discussed in the Watershed Section of this document. Provisions for fish passage accommodation have been included within all alternatives.

Habitat quality within these freshwater ecosystems is directly related to activities within the watershed. Therefore, the influence of these activities upon habitats, or water bodies, can be described to determine the condition of the habitat.

To determine if there is adequate quality habitat for these aquatic species, the condition of individual watersheds was determined from the physical and anthropogenic interactions within the watershed. Ideally, watershed condition would be determined from stream surveys. However, the extent and detail required to address all watersheds, including private land, with stream surveys was not available or reasonable to obtain for this analysis. To address habitat condition at the watershed level, it was necessary to determine values from geographic data. These values were compared among the watersheds, and a condition or set of conditions was determined.

The condition of each watershed containing any National Forest System land was assessed using the following criteria:

1. Sedimentation was assessed by determining the percent increase above the baseline sediment levels by watershed as assessed with the Watershed Condition Ranking. This process is described in detail in the Fish Assemblage – Sediment Profile and Sediment Yield sections.
2. Point Source Pollutants (density of point sources).
3. Riparian Habitat (road density in the riparian area, and percent forest in the riparian area).
4. Altered stream flow (density of dams, road density in the riparian, and average density of strip-mines).

Threats to aquatic species viability are not limited to these four variables; however, GIS coverages are not available for channelization and introduced species. For forest-level planning, it is assumed that these four condition categories are adequate when identified by watershed land disturbance activities in the planning area.

The watershed analysis for current condition determined that there was low risk of detrimental effects to water quality and aquatic habitat from predicted increases in sediment in all watersheds where species of viability concern are known to occur except those listed in Table 3.17 that have moderate or high risk of detrimental effects.

Table 3.17 Watersheds with Moderate or High Risk of Detrimental Effects from Predicted Increases in Sediment where Species of Viability Concern are Known to Occur

5th Level Hydrologic Unit Code Name (HUC)	Percent of HUC in NFS Ownership	Point Source Ranking	Riparian Health Ranking	Hydrological Modification Ranking	Sediment Ranking	Current Risk to Viability from Predicted Increased Sediment
1111010501 Poteau Headwaters	36.24	Good	Fair	Poor	Good	Moderate
1111010506 Riddle Creek	2.76	Good	Fair	Fair	Poor	High
1111020403 Deadman Creek	25.09	Very Good	Very Good	Good	Poor	High
1114010604 Norwood	10.96	Very Good	Good	Good	Poor	High
1114010605 McKinney Creek	3.73	Very Good	Very Good	Very Good	Poor	High
1114010705 Lower Little River	1.91	Good	Good	Fair	Good	Moderate
1114010901 Flat Creek	2.56	Good	Very Good	Good	Good	Moderate
1114010903 Lower Rolling Fork	1.12	Good	Very Good	Good	Good	Moderate

For each watershed and species, sensitivity to condition categories was assigned based on the species viability evaluation database, published literature, and personal communications. Species sensitivity to the four condition categories was compared with the condition of their respective watersheds to assess the threats to their persistence in the planning area.

Specific information is not available to determine the relationship between individual species and point source, riparian habitat, or altered flows; however, the establishment of groups identified by Jenk's optimization process illustrates the relative magnitude of each stressor within the range of current conditions. The relationship between fish community structure and sediment increase is definable and is discussed further in the Fish Assemblage–Sediment Profile section. As a result, sediment increase is the primary metric used for assessing the risk of maintaining the current viability of aquatic species populations. It is important to keep in mind, however, that the effect of any of the remaining stressors may increase the risk to aquatic fauna in a watershed.

Each aquatic species of concern was evaluated by risk (high, moderate, low) to the species' viability from detrimental influences from predicted increases in sediment within each watershed where it is known to occur. The importance of each watershed to the overall viability of the species (critical, high, moderate, low) was also taken into consideration. Overall forest-wide risk to viability per species was considered low unless the species occurred in a watershed of moderate or high risk to species viability. For those species, viability was evaluated and discussed by watershed as follows. To evaluate the 10-year and 50-year effects of the alternatives, the historical rate of change for each of these risk criteria values was determined and applied accordingly.

Viability determinations incorporate elements of species distribution, abundance, and sensitivities to environmental factors; watershed condition relative to the species' environmental sensitivities; and the national forest role in the watershed. Viability determinations are:

Outcome 1. Species occur within the watershed with minimal impairment. Likelihood of maintaining viability is high.

Outcome 2. Species viability is potentially at risk in the watershed; however, the extent and location of National Forest System land with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is moderate.

Outcome 3. Species viability is potentially at risk within the watershed; however, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Outcome 4. The species is so rare within the watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is moderate to low.

Outcome 5. The species is so rare within the watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Aquatic Federally Endangered and Threatened Species List

There are five federally endangered species and two federally threatened aquatic species listed as occurring or potentially occurring within the Forest. These include five mussel species, one fish species, and one plant species. The following tabulation lists the federally Threatened or Endangered aquatic species:

Common Name (Scientific Name)	Federal listing
Winged mapleleaf mussel (<i>Quadrula fragosa</i>)	Endangered
Ouachita rock-pocketbook (<i>Arkansia wheeleri</i>)	Endangered
Scaleshell mussel (<i>Leptodea leptodon</i>)	Endangered
Pink Mucket (<i>Lampsilis abrupta</i>)	Endangered
Arkansas fatmucket mussel (<i>Lampsilis powellii</i>)	Threatened
Leopard darter (<i>Percina pantherina</i>)	Threatened
Harperella (<i>Ptilimnium nodosum</i>)	Endangered

Appendix D contains the Biological Assessment on these and the other federally Threatened or Endangered species that occur on the Forest.

Winged Mapleleaf (*Quadrula fragosa*)

The winged mapleleaf freshwater mussel is not known to occur, but is believed to be within the Ouachita National Forest in both Oklahoma and Arkansas. Chemical and organic pollution, alteration and inundation of river channels, and siltation continue to have a severe negative impact on this species elsewhere in its range. Commercial harvest of shells may also be a threat. The winged mapleleaf is considered to be sensitive to pollution, siltation, habitat perturbation, and loss of glochidial host.

Direct, Indirect, and Cumulative Effects

Since there are no element occurrence records for this species on the Forest, the winged mapleleaf freshwater mussel was analyzed in relation to its rangewide status and distribution. Populations were discovered approximately 50 miles downstream from the Forest in the Ouachita River and approximately 100 miles downstream from the Forest in the Saline River, so recently (2000-2004) that it is difficult to determine trends, but the low numbers of individuals and limited distribution indicate that the populations are in a precarious position.

Forest-wide resource management standards, common to all alternatives and listed in the Revised Forest Plan under "Soil and Water Resources" and "Management Area 9 (Water and Riparian Communities)" concerning the conservation of soil productivity, water quality and other aquatic resources provide for the conservation of any potential winged mapleleaf habitat and for the quality of the water flowing downstream from the Forest. Because there are no individuals known to occur on the Ouachita National Forest, there would be no direct, indirect, or discernable negative cumulative effects to this species under any alternative.

Ouachita Rock-Pocketbook (*Arkansia wheeleri*)

Populations of this freshwater mussel are known to occur in the Kiamichi and Glover Rivers in Oklahoma and the Little River system in Oklahoma and Arkansas. Although it is not found within the Forest boundary, the Ouachita rock-pocketbook is known to occur within close proximity. The potential for occurrence along with the federally Endangered status of this species makes this a species of viability concern for the Forest.

Direct, Indirect, and Cumulative Effects

The Ouachita rock-pocketbook is known to occur downstream of Forest ownership in the Kiamichi, Lower Little River, and Flat Creek 5th level watershed (HUC) streams. The streams within these watersheds are considered of moderate value to the viability of the Ouachita rock-pocketbook mussel range-wide under all alternatives. The Kiamichi Headwaters watershed is in very good condition with low risk of detrimental influences to species viability (Outcome 1 - see Watershed Section).

The species is so rare within the Lower Little River and Flat Creek watersheds (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within these watersheds (Outcome 5). Therefore, the likelihood of maintaining current viability is low under all alternatives.

Table 3.18 displays the known occurrences of Ouachita rock-pocketbook mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed,

riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.18 Watershed Occurrences and Importance of National Forest System lands for the Ouachita Rock-Pocketbook Mussel

Species Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Ouachita Rock-Pocketbook (<i>Arkansia wheeleri</i>)	Kiamichi Headwaters	Moderate	49.83	Low	Outcome 1
	Lower Little River	Moderate	1.91	Moderate	Outcome 5
	Flat Creek	Moderate	2.56	Moderate	Outcome 5

Scaleshell Mussel (*Leptodea leptodon*)

The scaleshell mussel is poorly known, difficult to detect, and extremely rare. It is known to have occurred within the Forest, but distribution and densities are not well understood. The scaleshell mussel is found with increasing difficulty and so rarely that they do not appear to be members of viable populations (no evidence of recent reproduction).

Direct, Indirect, and Cumulative Effects

The scaleshell mussel was historically found to occur in the South Fork Fourche and Beech 5th level watershed (HUC) streams. These streams are considered of moderate value to the viability of the scaleshell mussel range-wide under all alternatives.

The species is so rare within the South Fork Fourche watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining current viability is moderate to low under all alternatives.

The species is so rare within the Beech watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining current viability is low under all alternatives.

Table 3.19 displays the known occurrences of scaleshell mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over

time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.19 Watershed Occurrences and Importance of National Forest System lands for the Scaleshell Mussel

Species Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Scaleshell (<i>Leptodea leptodon</i>)	South Fork Fourche	Moderate	54.26	Low	Outcome 4
	Beech	Moderate	15.31	Low	Outcome 3

Pink Mucket (*Lampsilis abrupta*)

The federally Endangered pink mucket mussel was historically known from 25 rivers and tributaries; in 1990, it was known from only 16 rivers and tributaries. This species has never been collected in large numbers from any one site or drainage, and most surveys only find one to five individuals. There are taxonomic concerns that Louisiana, Arkansas, and Missouri populations may represent another undescribed species. If populations west of the Mississippi River prove to be a different species, the rank will need to be reevaluated.

Records indicate occurrences in the upper Ouachita watershed below Remmel Dam, which is the third major impoundment on the Ouachita River downstream from the Forest. The species is very rare in Arkansas, and while it is likely that the species historically tended to occur in low numbers, the lack of recruitment and the difficulty with which it is found indicate that the species continues to decline in the state.

Direct, Indirect, and Cumulative Effects

The pink mucket has rarely been found to occur in the Poteau Headwaters and Flat Creek 5th level watershed (HUC) streams. These streams are considered of high value to the viability of this mussel on the Forest, but of moderate-to-low viability value range-wide under all alternatives.

The species is so rare within the Poteau Headwaters watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining current viability is moderate to low under all alternatives.

The species is so rare within the Flat Creek watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low under all alternatives.

Table 3.20 displays the known occurrences of pink mucket mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.20 Watershed Occurrences and Importance of National Forest System lands for the Pink Mucket Mussel

Species Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Pink Mucket (<i>Lampsilis abrupta</i>)	Poteau Headwaters	High	36.26	Moderate	Outcome 4
	Flat Creek	High	2.56	Moderate	Outcome 5

Arkansas Fatmucket (*Lampsilis powellii*)

Arkansas fatmucket mussels live only in Arkansas and are endemic to the Saline, Caddo, and upper Ouachita Rivers. Historically, this mussel species was found to be relatively common in preferred habitat; however, its frequency of detection and its population sizes have been consistently decreasing.

Direct, Indirect, and Cumulative Effects

The Arkansas fatmucket is known to occur in the Irons Fork, Kates Creek, Muddy Fiddler, South Fork Ouachita, Blakely, Caddo Headwaters, Carney Creek, Alum Fork, North Fork Saline, and Middle Fork Saline 5th level watershed (HUC) streams. Alum Fork and Kates Creek are considered of high value to the viability of the Arkansas fatmucket. Irons Fork, Muddy Fiddler, Caddo Headwaters, Carney Creek, North Fork Saline, and Middle Fork Saline watersheds are considered of moderate value to the viability of this mussel range-wide, and Blakely is considered of low value to this species viability. All ten of these watersheds are in very good condition with low vulnerability to detrimental influences from predicted increases in sediment relative to all watersheds within the Forest (see Watershed Section); therefore, likelihood of adversely affecting current viability is moderate to low under all alternatives.

However, this species is so rare and appears to be in decline in all watersheds where it is known to occur (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Table 3.21 displays the known occurrences of Arkansas fatmucket mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.21 Watershed Occurrences and Importance of National Forest System lands for the Arkansas Fatmucket Mussel

Species Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Arkansas Fatmucket (<i>Lampsilis powellii</i>)	Kates Creek	High	44.79	Low	Outcome 5
	South Fork Ouachita	High	66.43	Low	Outcome 4
	Alum Fork	High	30.03	Low	Outcome 5
	Irons Fork	Moderate	37.90	Low	Outcome 5
	Muddy Fiddler	Moderate	72.54	Low	Outcome 5
	Caddo Headwaters	Moderate	64.12	Low	Outcome 5
	Carney Creek	Moderate	14.79	Low	Outcome 5
	North Fork Saline	Moderate	23.07	Low	Outcome 5
	Middle Fork Saline	Moderate	12.17	Low	Outcome 5
	Blakely	Low	48.49	Low	Outcome 5

Leopard Darter (*Percina pantherina*)

The federally Threatened leopard darter is endemic to the Little River system in Arkansas and Oklahoma. While often quite abundant in its preferred habitats, the leopard darter habitat is usually restricted to small areas and can be quite disjunct. The leopard darter is generally found to occur in small to moderate-sized clear upland streams and rivers of moderate gradient. During non-spawning periods, it is usually found in pools of creeks and rivers favoring the cobble, small boulder habitat in the shallow areas of pools near the end of riffles. They are known to seek out the deep, cool pools during the hottest summer months.

The leopard darter has historically had very limited distribution, and is known to occur only in portions of five small, swift streams: the Cossatot River and Robinson Fork (the Rolling Fork River) in Arkansas; Glover and Little Rivers in Oklahoma; and the Mountain Fork River in both states. This restricted range was further reduced by impoundments of three rivers, forming Lakes Gillham, Broken Bow, and Pine Creek. Leopard darter habitat below the dams was decimated by reservoir releases.

The U.S. Fish and Wildlife Service designated Critical Habitat in the Little River system for the leopard darter (USFWS 1984). Those segments occurring within the Ouachita NF are: a 16.5-mile segment of the Glover River, the last free-flowing river in Oklahoma, and almost two miles of the Mountain Fork River upstream from Broken Bow Lake. Both of these Critical Habitat segments occur within Management Area 20—Wild and Scenic River Corridors. Limited vegetation management activities are planned for these corridors, as these areas are unsuitable in their entirety for timber production. The corresponding watersheds were analyzed as part of the Watershed Analysis process, and found to be in good condition with low vulnerability to detrimental influences from Forest Service management activities.

Direct, Indirect, and Cumulative Effects

The leopard darter is known to occur in the Glover, Two-mile, Beech, Broken Bow Lake, Upper Rolling Fork, and Cossatot Headwaters 5th level watershed (HUC) streams. The first four watersheds are considered of critical value to the viability of the leopard darter, and the last two of moderate value. All six of these watersheds are in very good condition with low vulnerability to detrimental influences from predicted increases in sediment relative to all watersheds within the Forest (see Watershed Section); therefore, likelihood of adversely affecting current viability is low under all alternatives.

However, this species is fairly rare in all watersheds where it is known to occur (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low under all alternatives.

Table 3.22 displays the known occurrences of leopard darter by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual eggs, larva, and/or adults could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to fish passage and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on leopard darter habitat due to forest-wide and management area specific standards (enumerated previously) designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.22 Watershed Occurrences and Forest Ownership Importance for the Leopard Darter

Species	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Leopard Darter (<i>Percina pantherina</i>)	Glover	Critical	16.82	Low	Outcome 5
	Two-mile	Critical	40.16	Low	Outcome 4
	Beech	Critical	15.31	Low	Outcome 5
	Broken Bow Lake	Critical	29.32	Low	Outcome 5
	Upper Rolling Fork	Moderate	0.14	Low	Outcome 5
	Cossatot Headwaters	Moderate	31.46	Low	Outcome 5

Harperella (*Ptilimnium nodosum*)

Populations of harperella (*Ptilimnium nodosum*) on the Forest are limited to stream/river channels. This federally listed Endangered vascular plant was first discovered on the Forest in September 1990. It is currently known from 11 locations on Forest lands on the Oden, Cold Springs, and Fourche Ranger Districts in Garland, Montgomery, Scott, and Yell Counties, as well as three privately owned sites.

It typically grows on rocky shoals, within crevices in exposed bedrock, and occasionally along sheltered muddy banks. It seems to exhibit a preference for the downstream margins of small pools or other spots of deposition of fine alluvium. In most harperella sites, there seems to be significant deposition of fine silts. It may occur in mostly sunny to mostly shaded sites. On the Forest, harperella occurs in perennial to near-perennial streams either on or among boulders or large cobbles or on coarse sediment bars.

Where harperella exists on the Forest and elsewhere throughout its range, population numbers often fluctuate from year-to-year in response to factors such as rainfall levels, and winter conditions affecting seedlings and drought. There is significant dynamism in the persistence of individual stands with population levels documented to have fluctuated as much as 30 percent in four years (USDI-FWS 1991a). A status report by Hardcastle and Williams (2001) used repeatable methods to estimate populations in the Ouachita National Forest. Potential and existing habitat conditions for this species frequently change with flood events and are not readily quantifiable. The assumption has been made that this species may occur wherever suitable habitat exists within perennial stream channels.

Direct, Indirect, and Cumulative Effects

Harperella is known to occur in the Cedar Creek, North Fork Ouachita, and South Fork Fourche, Muddy Fiddler 5th level watershed (HUC) streams. These four watersheds are considered of critical value to the viability of harperella. All four of these watersheds are in very good condition with low vulnerability to detrimental influences from predicted increases in sediment relative to all watersheds within the Forest (see Watershed Section); therefore, likelihood of adversely affecting current viability is low under all alternatives.

South Fork Fourche watershed reflects minimal impairment, but the known harperella occurrences are located on lands in private individual ownership. Species viability is potentially at risk in the watershed; however, the extent and location of National Forest System land with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is moderate under all alternatives.

Cedar Creek, North Fork Ouachita, and Muddy Fiddler also reflect minimal impairment; the harperella localities are located on lands in Forest ownership, where likelihood of maintaining viability is high under all alternatives.

Table 3.23 displays the known occurrences of harperella by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual plants could be directly harmed by vehicles crossing streams. Indirect effects could include excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on harperella habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.23 Watershed Occurrences and Importance of National Forest System (NFS) lands for Harperella

Common Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Harperella (<i>Ptilimnium nodosum</i>)	Cedar Creek	Critical	80.50	Low	Outcome 1
	South Fork Fourche	Critical	54.26	Low	Outcome 3
	Muddy Fiddler	Critical	72.54	Low	Outcome 1
	North Fork Ouachita	Critical	71.41	Low	Outcome 1

Other Aquatic Species of Viability Concern

Other aquatic species of viability concern were analyzed separately from the aquatic Threatened and Endangered species. This list was derived based on recommendations from local aquatic experts and from the most current Region 8 Regional Forester's Sensitive species list. Species are categorized as being Sensitive due to their endemic or restricted ranges, and/or current or predicted downward trends in population numbers and/or available habitat, which raises concern about long-term viability. Table 3.24 contains the current risk from predicted increases in sediment to other aquatic species of viability concern. For species occurrence and viability outcome for aquatic species of concern, see Appendix E-Biological Resources.

**Table 3.24 Current Risk to Species Viability from Predicted Increases in Sediment
Other Aquatic Species of Viability Concern**

Other Aquatic Species of Viability Concern Common Name (<i>Scientific Name</i>)	Watershed Occurrences by Risk Level			Risk to Species Viability from Predicted Increased Sediment
	High	Moderate	Low	
Crayfish Species				
Crayfish (<i>Fallicambarus harpi</i>)			3	Low
Crayfish (<i>Fallicambarus jeanae</i>)			3	Low
Crayfish (<i>Fallicambarus strawni</i>)			3	Low
Crayfish (<i>Orconectes menae</i>)			3	Low
Crayfish (<i>Orconectes saxatilis</i>)			1	Low
Crayfish (<i>Procambarus tenuis</i>)			2	Low
Crayfish (<i>Procambarus reimeri</i>)			1	Low
Fish Species				
Crystal Darter (<i>Crystallaria asprella</i>)		2		Moderate
Paleback Darter (<i>Etheostoma pallidorsum</i>)			6	Low
Goldstripe Darter (<i>Etheostoma parvipinne</i>)	2	3	1	Moderate
Ouachita Shiner (<i>Lythrurus snelsoni</i>)			3	Low
Redspot Chub (<i>Nocomis asper</i>)		1	1	Low
Kiamichi Shiner (<i>Notropis ortenburgeri</i>)	1	4	10	Low
Peppered Shiner (<i>Notropis perpallidus</i>)		2	6	Low
Ouachita Madtom (<i>Noturus lachneri</i>)			4	Low
Caddo Madtom (<i>Noturus taylori</i>)			8	Low
Longnose Darter (<i>Percina nasuta</i>)	1		1	Moderate
Ouachita Darter (<i>Percina</i> sp. nov)			3	Low
Mussels Species				
Elktoe (<i>Alasmidonta marginata</i>)			4	Low
Flat Floater (<i>Anodonta suborbiculata</i>)		1	3	Low
Spectacle Case (<i>Cumberlandia monodonta</i>)			1	Low
Western Fanshell (<i>Cyprogenia aberti</i>)			4	Low
Butterfly (<i>Ellipsaria lineolata</i>)	1	2	3	Moderate
Spike (<i>Elliptio dilatata</i>)	1		11	Low
Ebony Shell (<i>Fusconaia ebena</i>)	1	1	1	Moderate
Louisiana Fatmucket (<i>Lampsilis hydiana</i>)		3	15	Low
Southern Pocketbook (<i>Lampsilis ornata</i>)			4	Low
Sandbank Pocketbook (<i>Lampsilis satura</i>)		1	8	Low
Fatmucket (<i>Lampsilis siliquoidea</i>)		2	6	Low
Fluted Shell (<i>Lasmigona costata</i>)		2	13	Low
Black Sandshell (<i>Ligumia recta</i>)	1		9	Low
Southern Hickorynut (<i>Obovaria jacksoniana</i>)		2	8	Low
Ohio Pigtoe (<i>Pleurobema cordatum</i>)		1	1	Moderate
Pyramid Pigtoe (<i>Pleurobema rubrum</i>)		1	1	Moderate
Ouachita Kidneyshell (<i>Ptychobranhus occidentalis</i>)		2	17	Low
Rabbitsfoot (<i>Quadrula cylindrica cylindrica</i>)			1	Low
Monkeyface (<i>Quadrula metanevra</i>)		1	5	Low
Purple Lilliput (<i>Toxolasma lividus</i>)		1	5	Low
Ouachita Creekshell (<i>Villosa arkansasensis</i>)		1	16	Low
Rainbow (<i>Villosa iris</i>)		1	5	Low

All 7 crayfish species, 8 of the fish species, and 19 of the mussel species of viability concern are known to occur primarily in watersheds that are in good condition with low risks to species viability from detrimental influences from predicted increases in sediment relative to all watersheds within the Forest; therefore, likelihood of adversely affecting current viability from Forest management activities is low. Three fish species and four mussel species occur in watersheds where the risk to species viability from Forest management activities is moderate-low or moderate-high; these species are discussed below.

Crystal Darter

Direct, Indirect, and Cumulative Effects

The crystal darter is known to occur in two watersheds, Lower Little River and Flat Creek. Under all alternatives, both of these watersheds were rated as critical to species viability and of moderate risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream.

Therefore, these two watersheds were assigned to Viability Outcome 3 (species viability is potentially at risk within the watershed). However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Table 3.25 displays the known occurrences of crystal darter by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual eggs, juvenile, or adult fish could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to fish passage and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.25 Watershed Occurrences and Importance of National Forest System lands for Crystal Darter

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Crystal Darter (<i>Crystallaria asprella</i>)	1114010705 Lower Little River	Critical	1.91	Moderate	Outcome 3
	1114010901 Flat Creek	Critical	2.56	Moderate	Outcome 3

Goldstripe Darter

This fish species is restricted to Upper West Gulf Coastal Plain—OK, on the Forest with little National Forest ownership within watersheds of known occurrences.

Direct, Indirect, and Cumulative Effects

The goldstripe darter is known to occur in six watersheds. Under all alternatives, these watersheds were assigned to Viability Outcome 3 (species viability is potentially at risk within the watershed). However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within the watersheds. Therefore, likelihood of maintaining viability is low.

Table 3.26 displays the known occurrences of goldstripe darter by watershed the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System lands). There is a slight possibility that individual eggs, juvenile, or adult fish could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to fish passage and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.26 Watershed Occurrences and Importance of National Forest System lands for Goldstripe Darter

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Goldstripe Darter (<i>Etheostoma parvipinne</i>)	1114010604 Norwood	Critical	10.96	High	Outcome 3
	1114010605 McKinney Creek	Critical	3.73	High	Outcome 3
	1114010901 Flat Creek	Critical	2.56	Moderate	Outcome 3
	1114010903 Lower Rolling Fork	Critical	1.12	Moderate	Outcome 3
	1114010705 Lower Little River	High	1.91	Moderate	Outcome 3
	1114010805 Broken Bow Lake	Moderate	29.32	Low	Outcome 3

Kiamichi Shiner

The Kiamichi shiner is an endemic restricted to the Ouachita Mountains and West Gulf Coastal Plains in Arkansas and Oklahoma. It is generally found to be locally abundant.

Direct, Indirect, and Cumulative Effects

The Kiamichi shiner is known to occur in the watersheds listed in Table 3.27. Under all alternatives, four of the 14 watersheds were rated as of moderate or high risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream. Therefore, those four watersheds were assigned to the Viability Outcome 3 (species viability is potentially at risk within the watershed). However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low. The remaining 10 watersheds were rated as of low risk to species viability and were assigned to Viability Outcome 1: species occur within the watershed with minimal impairment; likelihood of maintaining viability is high.

Table 3.27 displays the known occurrences of Kiamichi shiner by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System lands). There is a slight possibility that individual eggs, juvenile, or adult fish could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to fish passage and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.27 Watershed Occurrences and Importance of National Forest System lands for Kiamichi Shiner

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Kiamichi Shiner (<i>Notropis ortenburgeri</i>)	1114010605 McKinney Creek	Critical	3.73	High	Outcome 3
	1111010501 Poteau Headwaters	Critical	36.24	Moderate	Outcome 3
	1111010502 Black Fork	Critical	73.55	Low	Outcome 1
	1111010503 Middle Poteau	Critical	41.22	Low	Outcome 1
	1111010505 Wister	Critical	33.44	Low	Outcome 1
	1111020601 Cedar Creek	Critical	80.42	Low	Outcome 1
	1114010501 Kiamichi Headwaters	Critical	49.83	Low	Outcome 1

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
	1114010705 Lower Little River	Critical	1.91	Moderate	Outcome 3
	1114010805 Broken Bow Lake	Critical	29.32	Low	Outcome 1
	1114010901 Flat Creek	Critical	2.56	Moderate	Outcome 3
	1114010902 Upper Rolling Fork	Critical	0.14	Low	Outcome 1
	1114010903 Lower Rolling Fork	Critical	1.12	Moderate	Outcome 3
	804010101 Irons Fork	Critical	37.90	Low	Outcome 1
	1114010704 Glover	High	16.82	Low	Outcome 1
	804020301 Alum Fork	High	30.03	Low	Outcome 1

Butterfly Mussel

The Butterfly mussel is found in medium to large rivers with gravel and gravel-sand substrate and good current. It is not considered to be widespread or abundant. It is found to sparsely occur in the Caddo, Cossatot, Little Missouri, Little, Ouachita, Saline, and St. Francis Rivers. The status of this species in Arkansas and Oklahoma is relatively uncertain.

Direct, Indirect, and Cumulative Effects

The butterfly freshwater mussel is known to occur in the watersheds as listed in Table 3.28. Under all alternatives, three of the six watersheds were rated as of moderate or high risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream. Therefore, those three watersheds were assigned to the Viability Outcome 3: Species viability is potentially at risk within the watershed; however, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

The remaining three watersheds were rated as of low risk to species viability and were assigned to Viability Outcome 1: Species occur within the watershed with minimal impairment. Likelihood of maintaining viability is high.

Table 3.28 displays the known occurrences of butterfly freshwater mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System lands). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include harm to fish host eggs, juvenile and/or adult individuals, creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects

of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.28 Watershed Occurrences and Importance of National Forest System lands for Butterfly Freshwater Mussel

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Butterfly Mussel (<i>Ellipsaria lineolata</i>)	1111020403 Deadman Creek	Moderate	25.11	High	Outcome 3
	1114010705 Lower Little River	High	1.91	Moderate	Outcome 3
	1114010901 Flat Creek	High	2.56	Moderate	Outcome 3
	1114010501 Kiamichi Headwaters	Moderate	49.83	Low	Outcome 1
	1114010704 Glover	Moderate	16.82	Low	Outcome 1
	804010206 Carney Creek	Moderate	14.79	Low	Outcome 1

Ebony Shell Freshwater Mussel

This species occurs in a number of watersheds across Arkansas in relatively high numbers; however, the population status of this species in the state is uncertain.

Direct, Indirect, and Cumulative Effects

The ebony freshwater mussel is known to occur in the watersheds as listed in Table 3.29. Under all alternatives, two of the three watersheds were rated as of moderate or high risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream. Therefore, those two watersheds were assigned to the Viability Outcome 3: Species viability is potentially at risk within the watershed. However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

The remaining watershed was rated as of low risk to species viability and was assigned to Viability Outcome 1: Species occur within the watershed with minimal impairment. Likelihood of maintaining viability is high.

Table 3.29 displays the known occurrences of ebony shell freshwater mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System lands). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include harm to the eggs, juvenile, or adult fish host individuals, creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to

have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.29 Watershed Occurrences and Importance of National Forest System lands for Ebony Shell Freshwater Mussel

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Ebony Shell Freshwater Mussel (<i>Fusconaia ebena</i>)	1111020403 Deadman Creek	Moderate	25.10	High	Outcome 3
	1114010805 Broken Bow Lake	Moderate	29.32	Low	Outcome 1
	1114010901 Flat Creek	Moderate	2.56	Moderate	Outcome 3

Ohio Pigtoe Mussel

The Ouachita form of the Ohio pigtoe may actually be multiple species. The true Ohio Pigtoe is a large river obligate. Occurrences on the Forest most likely represent specimens of Round Pigtoe (*P. sintoxia*). The taxonomic investigation is ongoing.

Direct, Indirect, and Cumulative Effects

The Ohio pigtoe freshwater mussel is known to occur in the two watersheds as listed in Table 3.30. Under all alternatives, these two watersheds were rated as of moderate and low risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream. Therefore, those two watersheds were assigned to the Viability Outcome 3: Species viability is potentially at risk within the watershed. However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Table 3.30 displays the known occurrences of the Ohio pigtoe mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System lands). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include harm to the eggs, juvenile or adult fish host individuals, creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.30 Watershed Occurrences and Importance of National Forest System lands for Ohio Pigtoe Mussel

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Ohio Pigtoe Mussel (<i>Pleurobema cordatum</i>)	1114010705 Lower Little River	High	1.91	Moderate	Outcome 5
	804010103 Muddy Fiddler	Moderate	72.54	Low	Outcome 2

Pyramid Pigtoe Mussel

This mussel species is extremely abundant in the lower Ouachita River and lower Saline River downstream from the Ouachita NF. The upper Ouachita and upper Saline Rivers' populations are peripheral to its range.

Direct, Indirect, and Cumulative Effects

The pyramid pigtoe freshwater mussel is known to occur in the two watersheds as listed in Table 3.31. These two watersheds were rated as of moderate and high risk to species viability due to low Forest ownership or Forest lands were not in close proximity to the stream. Therefore, those two watersheds were assigned to the Viability Outcome 3: Species viability is potentially at risk within the watershed. However, the extent and location of National Forest System land with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Table 3.31 displays the known occurrences of pyramid pigtoe mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, and the results of the analysis of indirect and cumulative effects (expressed in terms of risk to species viability from predicted increases in sediment by watershed and importance of National Forest System land). There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include harm to the eggs, juvenile, or adult fish host individuals, creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species under all alternatives.

Table 3.31 Watershed Occurrences and Importance of National Forest System lands for Pyramid Pigtoe Mussel

Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service	Risk to Species Viability from Predicted Increased Sediment by Watershed	NFS Ownership Importance
Pyramid Pigtoe Mussel (<i>Pleurobema rubrum</i>)	1111020403 Deadman Creek	High	25.09	High	Outcome 3
	1114010901 Flat Creek	Moderate	2.56	Moderate	Outcome 1

Stream Management Indicator Species

Following passage of the National Forest Management Act (NFMA) in 1976, the Secretary of Agriculture, on the advice of the Committee of Scientists, promulgated regulations to guide the development of plans for the National Forest System (36 CFR 219). For fish and wildlife resources, among other things, these regulations at 219.19(a)(1) state:

"In order to estimate the effects of each alternative on fish and wildlife populations, certain vertebrate and/or invertebrate species present in the area shall be identified and selected as management indicator species and the reasons for their selection will be stated. These species shall be selected because their population changes are believed to indicate the effects of management activities. In the selection of management indicator species, the following categories shall be represented where appropriate:

Endangered and threatened plant and animal species identified on State and Federal lists for the planning area; Species with special habitat needs that may be influenced significantly by planned management programs; Species commonly hunted, fished or trapped; Non-game species of special interest; and Additional plant or animal species selected because their populations changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality."

Section 219.19(a) (6) requires that:

Population trends of the management indicator species will be monitored and relationships to habitat changes determined. This monitoring will be done in cooperation with State fish and wildlife agencies to the extent practicable.

The Management Indicator Species Revised Forest Plan Selection Process Paper (August 2005) reviewed the Ouachita National Forest list of Management Indicator Species, and concluded 14 stream fishes were adequate to represent streams and rivers. The Process Paper summarizes monitoring information for these species and assesses their status and conservation needs after more than a decade of Forest Plan implementation experience. The lake/pond and terrestrial MIS are addressed in the lake/pond and terrestrial species sections, respectively, of the EIS.

The initial MIS listed species by Ecoregions (ADPC&E 1986) and the Forest fell into three general zones: Arkansas River Valley, Ouachita Mountain, and Gulf Coastal Plain. Table 3.32 lists the stream MIS species and the primary reason(s) for their selection.

Table 3.32 Selected Stream and River Management Indicator Species

Common Name	Scientific Name	Primary reason(s) for selection
Arkansas River Valley Ecoregion		
Yellow bullhead	<i>Ameiurus natalis</i>	To help indicate effects of management activities on aquatic habitat and water quality in streams within the Arkansas River Valley Ecoregion
Central stoneroller	<i>Campostoma anomalum</i>	
Redfin darter	<i>Etheostoma whipplei</i>	
Green sunfish	<i>Lepomis cyanellus</i>	
Longear sunfish	<i>Lepomis megalotis</i>	
Ouachita Mountain Ecoregion		
Central stoneroller	<i>Campostoma anomalum</i>	To help indicate effects of management activities on aquatic habitat and water quality in streams within the Ouachita Mountain Ecoregion
Johnny darter (within leopard darter range only)	<i>Etheostoma nigrum</i>	
Orangebelly darter	<i>Etheostoma radiosum</i>	
Redfin darter	<i>Etheostoma whipplei</i>	
Northern studfish	<i>Fundulus catenatus</i>	
Northern hog sucker	<i>Hypentilium nigricans</i>	
Green sunfish	<i>Lepomis cyanellus</i>	
Longear sunfish	<i>Lepomis megalotis</i>	
Striped shiner	<i>Luxilus chrysocephalus</i>	
Smallmouth bass	<i>Micropterus dolomieu</i>	
Channel darter (within leopard darter range only)	<i>Percina copelandi</i>	
Gulf Coastal Plain		
Pirate perch	<i>Aphredoderus sayanus</i>	To help indicate effects of management activities on aquatic habitat and water quality in streams within the Gulf Coastal Plain
Central stoneroller	<i>Campostoma anomalum</i>	
Creek chubsucker	<i>Erimzon oblongus</i>	
Green sunfish	<i>Lepomis cyanellus</i>	
Longear sunfish	<i>Lepomis megalotis</i>	
Forest-wide		
Smallmouth bass	<i>Micropterus dolomieu</i>	To help indicate effects of management activities on meeting public fishing demand in streams

According to the Management Indicator Species Report (October 2003), sampling data pertaining to the stream MIS species indicate that there are fluctuations in numbers of individuals from sample to sample and/or from year to year. However, all species are maintaining stable patterns within the natural range of variability and show no indication that management activities are detrimentally affecting the water quality, aquatic habitat or aquatic biological communities.

Direct, Indirect, and Cumulative Effects

The primary threats from Forest management activities to the persistence of aquatic species in stream/riverine habitats involve the manipulation of water flow and water quality. Water quality degradation through sedimentation may be caused by road and/or fireline construction, recreational activities, and silvicultural activities. Other threats to potential habitat loss and/or degradation are pesticides, channel alterations during road construction and maintenance, in-stream gravel mining, residential development, agricultural activities, and improperly treated municipal waste.

Alternative A provides the lowest level of management activities that would create any potential threats to water quality and aquatic habitat. Alternatives B and D would provide similar levels of

management activities, and Alternatives C and E would provide the highest levels of management activities that could potentially threaten the aquatic environment. The watershed assessment revealed that, although there were differences among alternatives and the current condition, there were no differences of risk to species viability from predicted increases in sediment among or between alternatives. This is a reflection of water quality and aquatic habitat protection design criteria/standards that would be applicable under all alternatives to all ground-disturbing management activities.

Direct effects include a slight possibility that individuals could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to aquatic passage and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from National Forest management activities is predicted to have no or discountable effects on aquatic habitat due to forest-wide and management area specific standards designed to protect water quality and aquatic habitats. Over time, the cumulative effects of National Forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for all aquatic species under all alternatives.

Terrestrial Communities

This section describes the current terrestrial conditions of the Forest, the relationship of these conditions to species of viability concern and management indicator species (MIS), and the biological effects of implementing each of the five alternatives. The analysis draws upon the most current available data concerning existing natural terrestrial communities and the role of fire within those communities; the distribution, abundance, and habitat relationships of species of viability concern and MIS; landtype associations; and watershed conditions. Central to the analysis is the comprehensive Ouachita National Forest Species Viability Evaluation (2004).

Habitat condition needs for species of viability concern and MIS are based on the most current science, literature, and expert opinion. Literature citations used for the SVE are in the SVE documentation available at www.aokforests.com or upon request. The species viability scores represent the average of the weighted "condition scores" (see Table 3.33) of the natural communities and habitat elements associated with a particular species of concern or MIS. For the Ouachita National Forest SVE, each community and habitat element was weighted by how important that community or habitat element is to the species (on a descending scale of "obligate," "optimal," "suitable," or "marginal"). Alternatives were compared on the basis of condition scores for each Conservation Target (natural community, habitat element, or species of viability concern).

Table 3.33 Species Viability Condition Scores for Terrestrial Communities

Range of Condition Score	Condition Classification	Definition of SVE Score Applied to Communities and Habitat Elements
3.51 – 4.00	Very Good	Community or Habitat Element conditions are optimal; associated species' populations should remain robust and potentially even expand
2.51 – 3.50	Good	Community or Habitat Element conditions are acceptable; associated species' populations should remain stable
1.51 – 2.50	Fair	Community or Habitat Element conditions are slightly inadequate; although associated species' populations may persist for some time, they may be subject to gradual decline
1.00 – 1.50	Poor	Community or Habitat Element conditions are severely inadequate. Associated species' populations are expected to severely decline; localized extirpations are occurring or are imminent

Terrestrial communities include all non-aquatic Ouachita Mountain and West Gulf Coastal Plain Ecological Community Systems listed by NatureServe (2003). Other terrestrial habitat elements include caves and mines, snags, dens, early seral vertical structure, mature trees/old growth, and large trees near water. Table 3.34 lists the terrestrial community types and their areal extent on the Forest.

Table 3.34 NatureServe Communities occurring within the Ouachita National Forest

NatureServe Communities	Percent of Forest
Ouachita Shortleaf Pine-Oak Forest and Woodland CES202.313 (Sub-Communities)	
1) Ouachita Shortleaf Pine-Oak Forest	44.7
2) Ouachita Pine-Oak Woodland	13.6
3) Ouachita Shortleaf Pine – Bluestem	11.4
West Gulf Coastal Plain Pine-Hardwood Flatwoods CES203.378	<0.1
Ouachita Dry-Mesic Hardwood Forest CES202.708	12.4
Ouachita Mesic Hardwood Forest CES202.043	1.8
Ouachita Montane Oak Forest CES202.306	0.6
Ouachita Dry Oak Woodlands CES202707	0.3
Ouachita Novaculite Glade and Woodland CES202.314	<0.1
Central Interior Acidic Cliff and Talus CES202.689	0.3
Central Interior Highlands Dry Acidic Glade and Barrens CES202.692	0.2
Southern Arkansas/Oklahoma Calcareous Prairie CES203.377	<0.1
Ouachita Riparian CES202.703	13.2
Ouachita Mountain Forested Seeps CES202.321	<0.1
South-Central Interior Large Floodplain CES202.705	<0.1
West Gulf Coastal Plain Small Stream and River Forest CES203.487	0.3
West Gulf Coastal Plain Wet Hardwood Flatwoods CES203.548 (Red Slough WMA)	0.2

The scoring benchmarks for community conditions are derived for areal extent, canopy closure, vertical structure, fire regime, and remoteness/road density. The associated indicators are weighted as to the importance of the condition (high–3, medium–2, low–1). If no weight is designated, then the scoring system defaults to medium–2.

The areal extent of communities is the percent of the Forest each vegetation system represents. Canopy closure is a combination of stem density, basal area, and extent of canopy cover. Canopy closure is used primarily to distinguish a closed-canopy forested condition from an open to intermittent-canopy woodland condition. Vertical structure within each vegetation community is represented by age or diameter classes:

- Early seral includes the 0-5 year-old grass/forb stage plus the 6-10 year-old shrub stage (in woodland communities, "percent herbaceous ground cover" includes early seral stage plus 40% of the late seral stage to include the woodland herbaceous layer); the importance of the early seral indicator was weighted as high (3).
- Mid-seral structure includes all age-classes and diameters in the immature forest and woodland condition class; the importance of this indicator was weighted as low (1).
- Late seral includes mature forest and woodland trees with diameters at breast height of greater than 9.5 inches for pine and 12 inches for hardwood; the importance of this indicator was weighted as medium (2).

Fire regime includes how frequently fires occur and the season in which the burn occurs (dormant or growing). The cool or dormant season is considered to be October through February, and the growing season is March through September. The frequency of the burns is weighted more heavily (3 to 1) than the season of the burn. Most of the natural communities of the Ouachita National Forest are slightly, moderately, or highly dependent on certain fire regimes to restore and maintain "good" conditions. Remoteness refers to the mean density of roads within each community type across the Forest.

The fire regime condition class reference conditions describing the role of fire in ecological communities (Masters and Guyette 2004) and other fire effects related research (Spetich 2004; Jurney and others 2001; Masters and others 1995; Foti and Guldin 1994; Foti and Glenn 1991) associated with fire-adapted ecosystems in the Interior Highlands of Arkansas, Missouri, and Oklahoma were compared to NatureServe community descriptions to better define the seasonality and frequency of fire by community type. Another source used extensively in researching the role of fire in ecological communities and for individual species found in the Ouachitas was the Fire Effects Information System online at <http://www.fs.fed.us/database/feis/index.html>.

Ouachita Shortleaf Pine-Oak Forest and Woodland

Ouachita Shortleaf Pine-Oak Forest Subsystem

Ouachita Shortleaf Pine-Oak Woodland Subsystem

Ouachita Shortleaf Pine-Bluestem Woodland (including Red-cockaded Woodpecker Habitat) Subsystem

This system represents forests and woodlands of the Ouachita Mountain region of Arkansas and adjacent Oklahoma in which shortleaf pine is an important or dominant component. Shortleaf pine was ubiquitous in the forests of the Ouachitas prior to major European settlement and timber exploitation (Sargent 1884; Mattoon 1915; Smith 1986; Foti and Glenn 1991), and it remains so today. Shortleaf pine often occurs with a mixture of hardwood species but also occurs naturally in nearly pure stands. In some examples of this system, the aggregate importance of hardwoods may be greater than pine, especially on subxeric and mesic sites, in which case, the community is often referred to as an oak-pine forest or woodland. The shortleaf pine-oak forest and woodland system comprises approximately 70 percent of the Forest. This system has been divided into three subsystems (pine-oak forest, pine-oak woodlands, and pine-bluestem woodlands).

Ouachita Shortleaf Pine-Oak Forest

Ouachita shortleaf pine-oak forest represents the most densely wooded, generally closed-canopy component of the pine-oak system. Currently, the pine-oak forest subsystem makes up approximately 71 percent of the pine-oak system and occupies about 50 percent of the Forest. These percentages reflect decades of fire suppression and human-influenced changes in fuel loads and fire behavior in Ouachita National Forest System landscapes. With a fire regime closer to the historic range of variability, the pine-oak forest subsystem would probably occupy 45-65 percent of the pine-oak system. Table 3.35 presents key factors for the Ouachita pine-oak forest current condition.

Table 3.35 Ouachita Pine-Oak Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Score
Areal Extent	Percent of pine-oak systems in forested condition	<40 or >75	40-44 or 66-75	45-49 or 61-65	50-60	71.00	Fair
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	93.00	Very Good
Fire Frequency	Percent burned every 5-7 years	<25	25-50	51-75	>75	17.40	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<20	20-40	41-70	>70	42.40	Good
Remoteness	Road Density in miles/mile ²	>2	1-2	0.5-1	<0.5	2.33	Poor
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<4 or >20	4-6 or 15-20	6-7 or 13-14	8-12	2.48 (24,765 acres)	Poor
Vertical Structure	Percent Mid-Seral (Immature Forest)	<5 or >45	5-10 or 40-45	10-15 or 30-40	15-30	28.60 (285,597 acres)	Very Good
Vertical Structure	Percent Late Seral (Mature Forest)	<50 or >95	50-60 or 91-95	60-70 or 81-90	70-80	68.92 (688,229 acres)	Good
Composite SVE Score is 2.06 - Fair							

The overall SVE condition score for the pine-oak forest community is 2.06 ("Fair"). The vertical structure needed to sustain "good/very good" conditions in pine-oak forest is 6-14 percent in grass/forb/shrub condition and 60-90 percent in mature forest condition. Current vertical structure

condition is 2.48 percent in grass/forb/shrub stages, and 68.9 percent in the mature forest condition. A substantial portion of the current acreage in the grass/forb/shrub stages consists of 10+ year-old pine plantations and heavily thinned pine and pine-oak stands acquired in land exchanges and land purchases in the mid-1990s. Such areas will soon be more appropriately characterized as mid-seral stands.

The fire regime needed to sustain good/very good conditions is one in which at least 50 percent of the pine-oak forest community burns at least once every 5-7 years and has an occasional growing season burn. Figure 3.12 shows vertical structure and fire regime current condition for this system. The current fire history reflects that 17.4 percent of the pine-oak forest community is burned every 5-7 years, and that 42.4 percent of the burned area receives an occasional growing season burn.

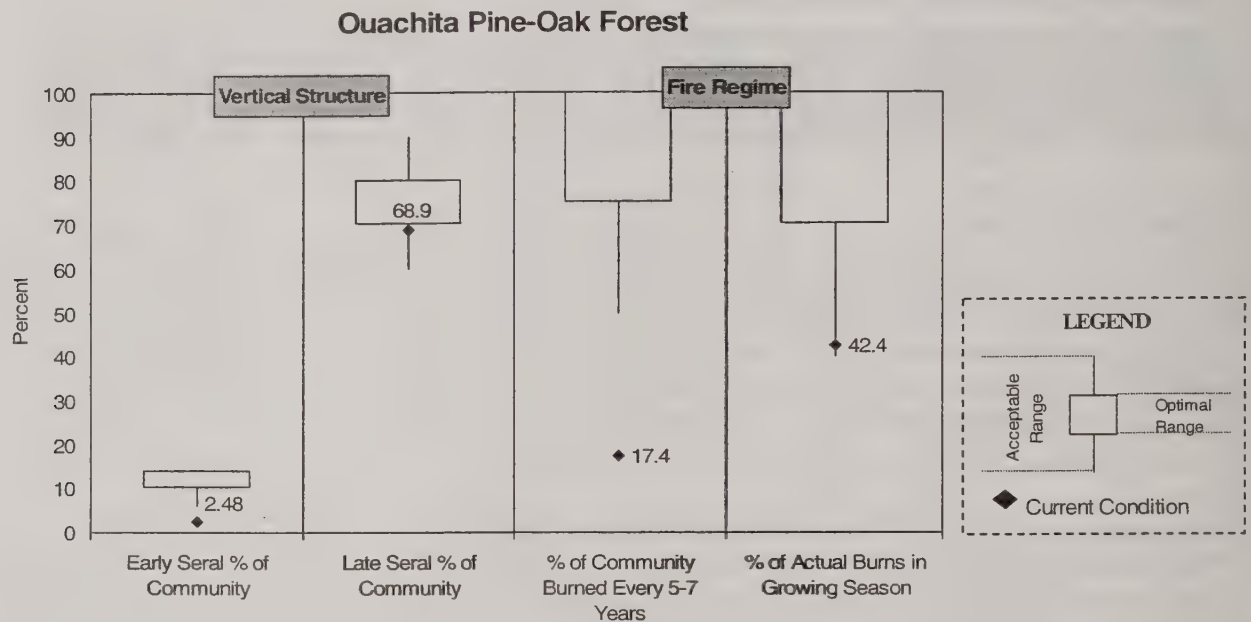


Figure 3.12 Vertical Structure and Fire Regime, Ouachita Pine-Oak Forest

The grass/forb/shrub, immature and/or mature structure of pine-oak forests provides optimal habitat for seven species, suitable habitat for 24 species, and marginal habitat for two species included in the SVE. One of the SVE species for which this subsystem provides optimal conditions is also an MIS, and one of the SVE species for which this subsystem provides suitable conditions is also an MIS. In addition, one MIS not considered in the SVE analysis finds "optimal" habitat here, and three more MIS find suitable habitat in this subsystem. In the following tabulation, the MIS are labeled (MIS that were evaluated as part of the SVE are labeled "SVE/MIS"):

Species	Importance of Pine-Oak Forest
Prairie Warbler (<i>Dendroica discolor</i>) SVE/MIS	Optimal
Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS	
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	
Brown-headed Nuthatch (<i>Sitta pusilla</i>)	
Bewick's Wren (<i>Thryomanes bewickii</i>)	
American Burying Beetle (<i>Nicrophorus americanus</i>)	
Diana Fritillary (<i>Speyeria diana</i>)	

Species	Importance of Pine-Oak Forest
Mole Salamander (<i>Ambystoma talpoideum</i>) Caddo Mountain Salamander (<i>Plethodon caddoensis</i>) Fourche Mountain Salamander (<i>Plethodon fourchensis</i>) Kiamichi Mountain Salamander (<i>Plethodon kiamichi</i>) Sequoyah Slimy Salamander (<i>Plethodon sequoyah</i>) Southern Redback Salamander (<i>Plethodon serratus</i>) Bachman's Sparrow (<i>Aimophila aestivalis</i>) Chuck-will's-widow (<i>Caprimulgus carolinensis</i>) Whip-poor-will (<i>Caprimulgus vociferus</i>) Northern Bobwhite (<i>Colinus virginianus</i>) SVE/MIS American Kestrel (<i>Falco sparverius</i>) Bald Eagle (<i>Haliaeetus leucocephalus</i>) Worm-eating Warbler (<i>Helminthos vermivorus</i>) Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS Kentucky Warbler (<i>Oporornis formosus</i>) Scarlet Tanager (<i>Piranga olivacea</i>) MIS White-eyed Vireo (<i>Vireo griseus</i>) Hooded Warbler (<i>Wilsonia citrina</i>) White-tailed Deer (<i>Odocoileus virginianus</i>) MIS Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>) Waterfall's Sedge (<i>Carex latebracteata</i>) Ozark Chinquapin (<i>Castanea pumila</i> var <i>ozarkensis</i>) Shinnery Sunflower (<i>Helianthus occidentalis</i> ssp <i>plantagineus</i>) Timber Rattlesnake (<i>Crotalus horridus</i>)	Suitable
Ouachita Leadplant (<i>Amorpha ouachitensis</i>) Southern Prairie Skink (<i>Eumeces septentrionalis obtusirostris</i>)	Marginal

Ouachita Shortleaf Pine-Oak Woodland

Ouachita shortleaf pine-oak woodland is an open canopied, fire-dependent subsystems with abundant herbaceous ground cover. Based on an analysis of landtype associations, 20-45 percent of the pine-oak system could be in pine-oak woodland conditions, given an appropriate combination of thinning and burning. Currently, this woodland subsystem makes up about 23 percent of the shortleaf pine-oak communities and 16 percent of the Forest. These figures reflect decades of fire suppression and human-influenced changes in fuel loads and fire behavior in Ouachita National Forest System landscapes. Table 3.36 presents key factors for the Ouachita pine-oak woodland current condition.

Table 3.36 Ouachita Pine-Oak Woodland Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Areal Extent	Percent of pine-oak systems in or dedicated to restored pine-oak woodland condition	<15 or >50	15-19 or 46-50	20-25 or 41-45	25-40	23.4	Good
Canopy Closure	Percent of the areal extent with 40-80% canopy closure	>90 or <30	81-90 or 30-40	71-80 or 41-50	51-70	67.3	Good
Fire Frequency	Percent burned every 3-5 years	<25	25-50	51-75	>75	3.2	Poor

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<20	20-40	41-70	>70	23.8	Fair
Remoteness	Road Density in miles/mile ²	>2	1-2	0.5-1	<0.5	1.89	Fair
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<4 or >20	4-6 or 15-20	6-7 or 13-14	8-12	0 (0 acres)	Poor
Vertical Structure	Percent Mid-Seral (Immature Woodland)	<5 or >45	5-10 or 40-45	10-15 or 30-40	15-30	18.3 (46,674 acres)	Very Good
Vertical Structure	Percent Late Seral (Mature Woodland)	<50 or >95	50-60 or 91-95	60-70 or 81-90	70-80	81.7 (208,628 acres)	Good
Percent herbaceous ground coverage	Percent of pine-oak woodlands supporting a grass/forb layer	<25	25-40	41-75	>75	32.68 (83,451 acres)	Fair
Composite SVE Score is 2.11 - Fair							

Overall SVE condition score for the pine-oak woodlands is 2.11 ("Fair"). A defining characteristic of this pine-oak woodland subsystem is canopy closure condition of less than 70 percent; current canopy closure is 89 percent. Based on the SVE, the vertical structure needed to support good/very good conditions is 6-14 percent in grass/forb/shrub and 60-90 percent in the mature forest condition. Current vertical structure condition is 0 percent in grass/forb/shrub, and 81.7 percent in the mature forest condition.

The fire regime needed to support good/very good conditions is one in which at least 50 percent of the pine-oak woodland community is burned every 3-5 years, with occasional growing season burns included. The current fire history reflects that less than 4 percent of the pine-oak woodland community is burned every 3-5 years, and less than 24 percent of the burned areas receive an occasional growing season burn. Figure 3.13 shows vertical structure and fire regime current condition for this system.

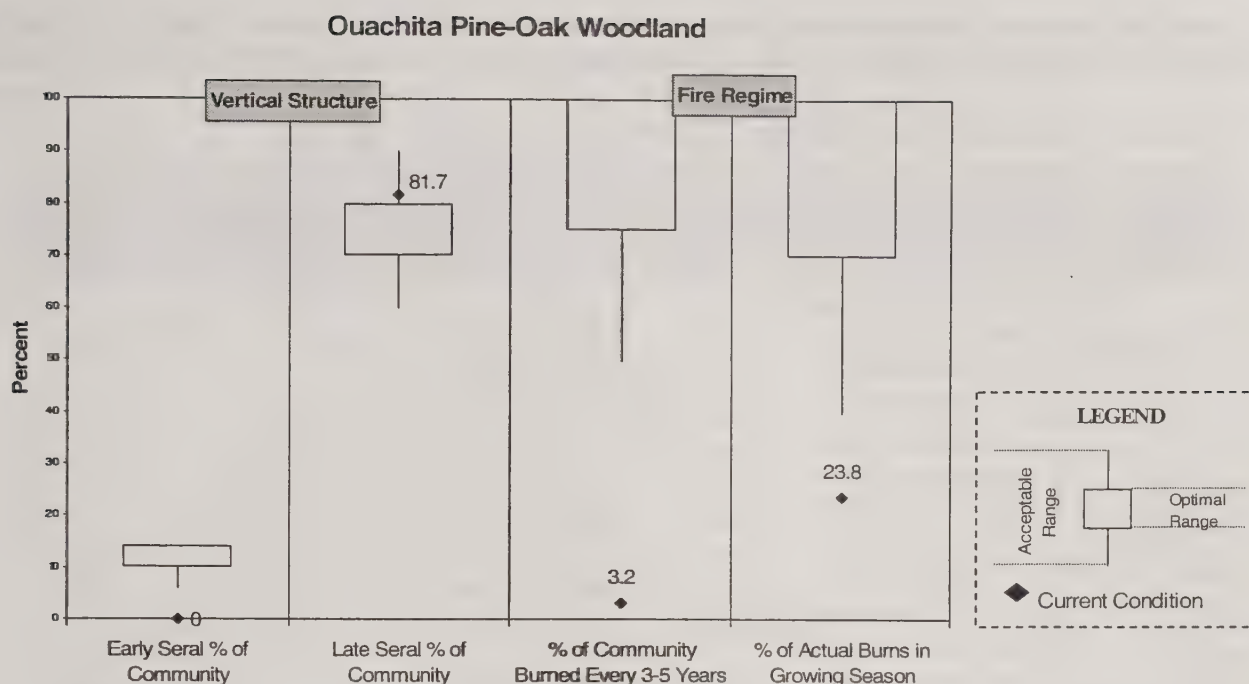


Figure 3.13 Vertical Structure and Fire Regime Condition, Ouachita Pine-Oak Woodland

The grass/forb/shrub, immature and/or mature structure of shortleaf pine-oak woodlands provides optimal habitat for eight species and suitable habitat for three species considered in the SVE. Of those species that find optimal habitat in this subsystem, two are also MIS; four additional MIS also find optimal habitat here. In the following tabulation, the MIS are labeled; MIS that were evaluated as part of the SVE are labeled "SVE/MIS:"

Species	Importance of Pine-Oak Woodland
Red-cockaded Woodpecker (<i>Picoides borealis</i>) SVE/MIS	Optimal
Prairie Warbler (<i>Dendroica discolor</i>) SVE/MIS	
Bachman's Sparrow (<i>Aimophila aestivalis</i>)	
Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS	
Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS	
Northern Bobwhite (<i>Colinus virginianus</i>) SVE/MIS	
Scarlet Tanager (<i>Piranga olivacea</i>) MIS	
White-tailed Deer (<i>Odocoileus virginianus</i>) MIS	
Timber Rattlesnake (<i>Crotalus horridus</i>)	Suitable
Western Diamondback Rattlesnake (<i>Crotalus atrox</i>)	
Great Plains Skink (<i>Eumeces obsoletus</i>)	
Southern Prairie Skink (<i>Eumeces septentrionalis obtusirostris</i>)	

Ouachita Shortleaf Pine-Bluestem Woodland (includes Red-cockaded Woodpecker Habitat)

Ouachita shortleaf pine-bluestem woodland represents the most open-canopy, pine-dominated, fire-dependent component of pine-oak systems on the Forest. Currently, this subsystem constitutes approximately 14.3 percent of the shortleaf pine-oak dominated communities and 4 percent of the Forest. Based on landtype associations, the shortleaf pine-bluestem woodland subsystem could occupy 10-30 percent of all known pine-oak dominated systems. This community represents the most intensely managed system towards restoration of this historically predominant condition. This woodland condition with frequent fires has undergone a great deal of conversion to a forested

condition due to a decrease in vegetation management and suppression of the natural fire regime. Table 3.37 lists the key factors for Ouachita shortleaf pine-bluestem woodland current condition.

Table 3.37 Ouachita Shortleaf Pine-Bluestem Woodland Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Areal Extent	Percent of pine-oak systems in shortleaf pine-bluestem condition	<5 or >30	5-9 or 25-30	10-15 or 26-30	16-25	14.3	Good
Canopy Closure	Percent of the areal extent with 40-80% canopy closure	>90 or <30	81-90 or 30-40	71-80 or 41-50	51-70	31	Fair
Fire Frequency	Percent burned every 3-5 years	<25	25-50	51-75	>75	83.9	Very Good
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<20	20-40	41-70	>70	77.7	Very Good
Remoteness	Road Density in miles/mile ²	>2	1-2	0.5-1	<0.5	2.06	Poor
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<2 or >12	2-3 or 9-12	3-4 or 8-9	5-7	2.0 (1,144 acres)	Fair
Vertical Structure	Percent Mid-Seral (Immature Woodland)	>30	21-30	10-20	<10	32 (18,308 acres)	Poor
Vertical Structure	Percent Late Seral (Mature Woodland)	<30 or >95	31-60 or 91-95	60-65 or 75-90	65-75	66 (37,761 acres)	Very Good
Percent Herbaceous Ground Coverage	Percent of pine-bluestem woodlands supporting a grass/forb layer	<25	25-40	41-75	>75	28.4 (16,248 acres)	Fair
Composite SVE Score is 2.61 - Good							

Overall SVE condition score for the pine-bluestem woodlands is 2.61 ("Good"). The defining characteristics of this subsystem are canopy closure of 40-70 percent, sparse to absent midstory, abundant herbaceous groundcover, and a minimal oak component among the dominant canopy trees. The current SVE reflects a canopy closure of 31 percent, taking into account the recent intense efforts to restore the pine-bluestem condition through thinnings and frequent prescribed burns.

Based on the SVE, the vertical structure needed to support good/very good conditions is 3-8.3 percent in grass/forb/shrub, and 60-90 percent in the mature forest condition. Current vertical structure condition is 2.0 percent in grass/forb/shrub, and 66 percent in the mature forest condition.

The fire regime needed to support good/very good conditions is one in which at least 50 percent of the pine-bluestem woodland community is burned every 3-5 years, with an occasional growing season burn included. The SVE fire history reflects that 83.9 percent of the pine-bluestem woodland

community is burned every 3-5 years, and 78 percent of the burned area receives an occasional growing season burn. Figure 3.14 shows vertical structure and fire regime current condition for this system.

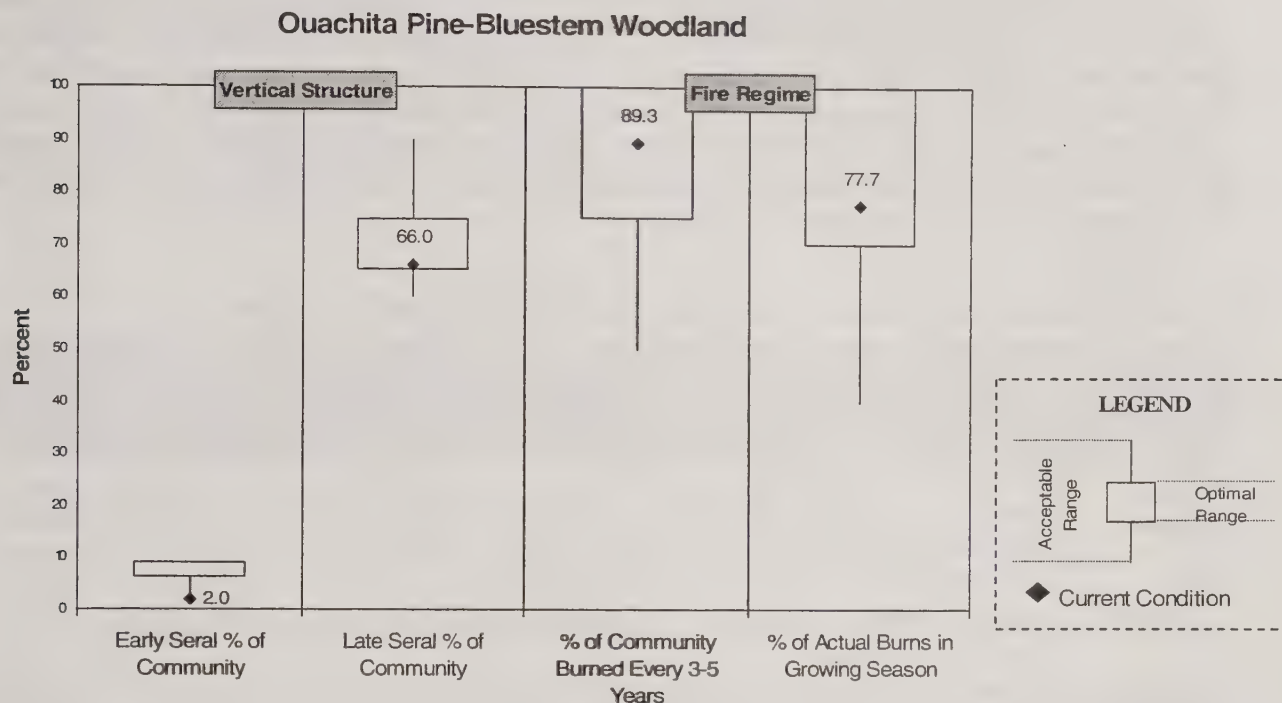


Figure 3.14 Vertical Structure and Fire Regime Condition, Ouachita Pine-Bluestem Woodland

Ouachita shortleaf pine-bluestem woodlands' grass/forb/ shrub, immature and/or mature structure provides obligate habitat for one species, optimal habitat for eight species, and suitable habitat for four species considered in the SVE. One of the species for which this subsystem provides obligate conditions is also an MIS; two species in the "optimal" category are also MIS; and a fourth MIS not considered in the SVE finds optimal conditions here as well. In the following tabulation, the MIS are labeled (MIS that were evaluated as part of the SVE are labeled "SVE/MIS"):

Species	Importance of Pine-Bluestem Woodland
Brown-headed Nuthatch (<i>Sitta pusilla</i>)	Obligate
Red-cockaded Woodpecker (<i>Picoides borealis</i>) SVE/MIS	Optimal
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	
Bachman's Sparrow (<i>Aimophila aestivalis</i>)	
Prairie Warbler (<i>Dendroica discolor</i>) SVE/MIS	
American Kestrel (<i>Falco sparverius</i>)	
Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS/Demand	
Northern Bobwhite (<i>Colinus virginianus</i>) SVE/MIS/Demand	
Diana Fritillary (<i>Speyeria diana</i>)	
White-tailed Deer (<i>Odocoileus virginianus</i>) MIS/Demand	Suitable
Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS	
Western Diamondback Rattlesnake (<i>Crotalus atrox</i>)	
Great Plains Skink (<i>Eumeces obsoletus</i>)	
Southern Prairie Skink (<i>Eumeces septentrionalis obtusirostris</i>)	

West Gulf Coastal Plain Pine-Hardwood Forest

This West Gulf Coastal Plain (WGCP) ecological system represents less than one percent of the Forest and consists of forests and woodlands dominated by shortleaf pine and loblolly pine in combination with a variety of dry to dry-mesic hardwood species. In southeastern Oklahoma, this type was historically present on nearly all WGCP uplands except on the most edaphically limited sites (droughty sands, calcareous clays, and shallow soil barrens or rock outcrops). These relatively upland sites are underlain by loamy to fine-textured soils of varying depths along low ridges and side slopes, with moderate fertility and moisture retention. Table 3.38 lists the key factors for West Gulf Coastal Plain pine-hardwood forest current condition.

Table 3.38 West Gulf Coastal Plain Pine-Hardwood Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	93	Very Good
Fire Frequency	Percent burned every 3-5 years	<25	25-50	51-75	>75	6.3	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<25	25-50	51-75	>75	53.2	Good
Remoteness	Road density in miles/mile ²	>2	1-2	0.5-1	<0.5	2.39	Poor
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<4 or >20	4-6 or 15-20	6-7 or 13-14	10-12	1.7 (136 acres)	Poor
Vertical Structure	Percent Mid-Seral (Immature Forest)	<5 or >45	5-10 or 40-45	11-15 or 30-40	16-30	23.6 (1,899 acres)	Very Good
Vertical Structure	Percent Late Seral (Mature Forest)	<50 or >95	50-60 or 91-95	60-70 or 81-90	70-80	74.7 (6,015 acres)	Very Good
Composite SVE Score is 1.92 - Fair							

The overall SVE condition score for the WGCP pine-hardwood forest is 1.92 ("Fair"). Based on the SVE, the vertical structure needed to support good/very good conditions is 6-14 percent in grass/forb/shrub, and 60-90 percent in the mature, fire-maintained forest condition. Current vertical structure condition is 1.7 percent in grass/forb/shrub, and 74.7 percent in the mature forest condition.

Based on the SVE, the fire regime needed to support good/very good conditions is one in which at least 50 percent of the WGCP pine-hardwood forest community is burned every 3-5 years, with an occasional growing season burn included. The current fire history reflects that 6.3 percent is burned every 3-5 years, and that 53.2 percent of the burned area receives an occasional growing season burn. Figure 3.15 shows vertical structure and fire regime current condition for this system.

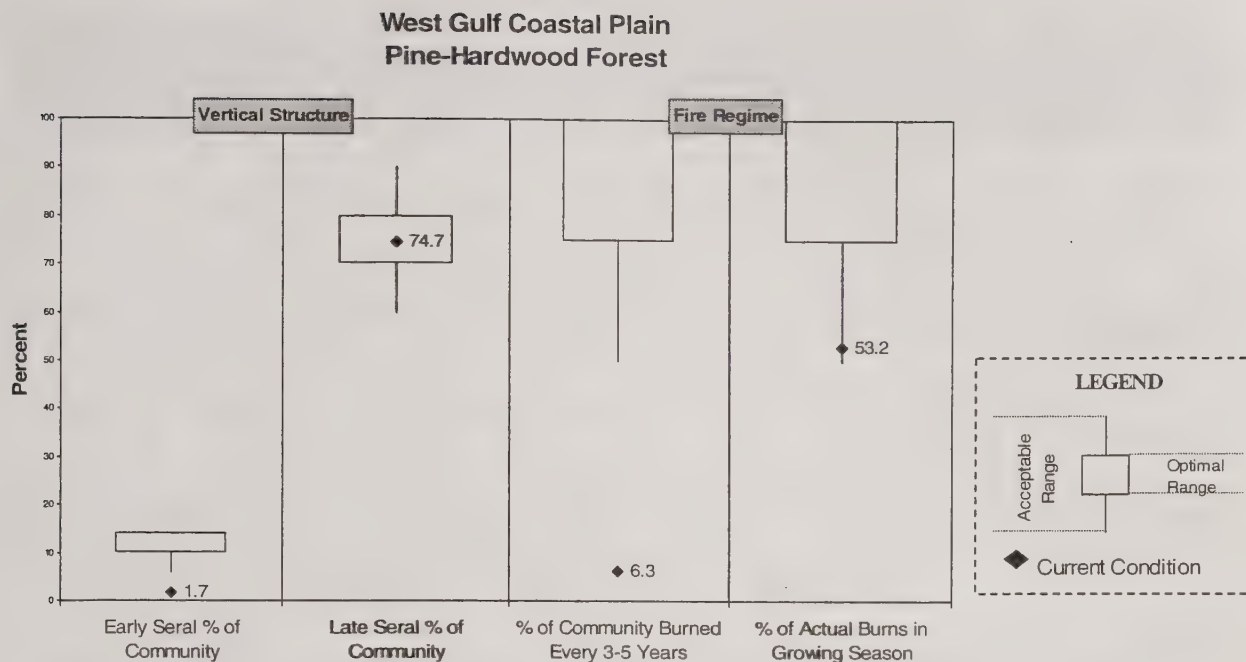


Figure 3.15 Vertical Structure and Fire Regime Condition, WGCP Pine-Hardwood Forest

As shown in the following tabulation, WGCP pine-hardwood forests provide optimal habitat for one MIS and suitable habitat for two MIS:

Species	Importance of WGCP Pine-Hardwood Forest
Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS	Optimal
Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS White-tailed Deer (<i>Odocoileus virginianus</i>) MIS	Suitable

Ouachita Dry-Mesic Oak Forest

This system, which is found throughout the Ozark and Ouachita Highlands, constitutes approximately 12 percent of the Forest. It occurs on dry to mesic, gentle to moderately steep slopes. Typically, soils are moderately to well drained and more fertile than those associated with drier, more open oak woodlands. A closed canopy of oak and hickory typifies this system. Maples, gums, and other hardwoods may also appear in the canopy. Wind, drought, occasional fires, and infrequent ice storms influence this system. Table 3.39 lists the key factors for Ouachita dry-mesic oak forest current condition.

Table 3.39 Ouachita Dry-Mesic Oak Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	99.2	Very Good
Fire Frequency	Percent burned every 5-7 years	<25	25-50	51-75	>75	11.9	Poor
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<25	25-50	51-75	>75	34.8	Fair
Remoteness	Road Density in miles/mile ²	>2	1-2	0.5-1	<0.5	1.07	Fair
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<2 or >14	2-4 or 10-14	7-10	4-6	0.79 (1,828 acres)	Poor
Vertical Structure	Percent Mid-Seral (Immature Forest)	<10 or >45	0-15 or 35-45	15-20 or 30-35	20-30	52.1 (120,583 acres)	Poor
Vertical Structure	Percent Late Seral (Mature Forest)	<50 or >95	50-60 or 91-95	60-70 or 81-90	70-80	47.1 (109,035 acres)	Poor
Composite SVE Score is 1.64 - Fair							

Overall SVE condition score for the dry-mesic oak forest is 1.64 ("Fair"). Based on the SVE, the vertical structure needed to support good/very good conditions is 4-10 percent in grass/forb/shrub, and 60-90 percent in mature, fire-maintained forest condition. Current vertical structure is 0.79 percent in grass/forb/shrub, and 47.1 percent in the mature forest condition.

The fire regime needed to support good/very good conditions is one in which at least 50 percent of the dry-mesic oak forest community is burned every 5-7 years, with an occasional growing season burn included. The current fire history reflects that 11.9 percent of this community is burned every 5-7 years, and 34.8 percent of the burned area receives an occasional growing season burn. Figure 3.16 shows vertical structure and fire regime current condition for this system.

Ouachita Dry-Mesic Oak Forest

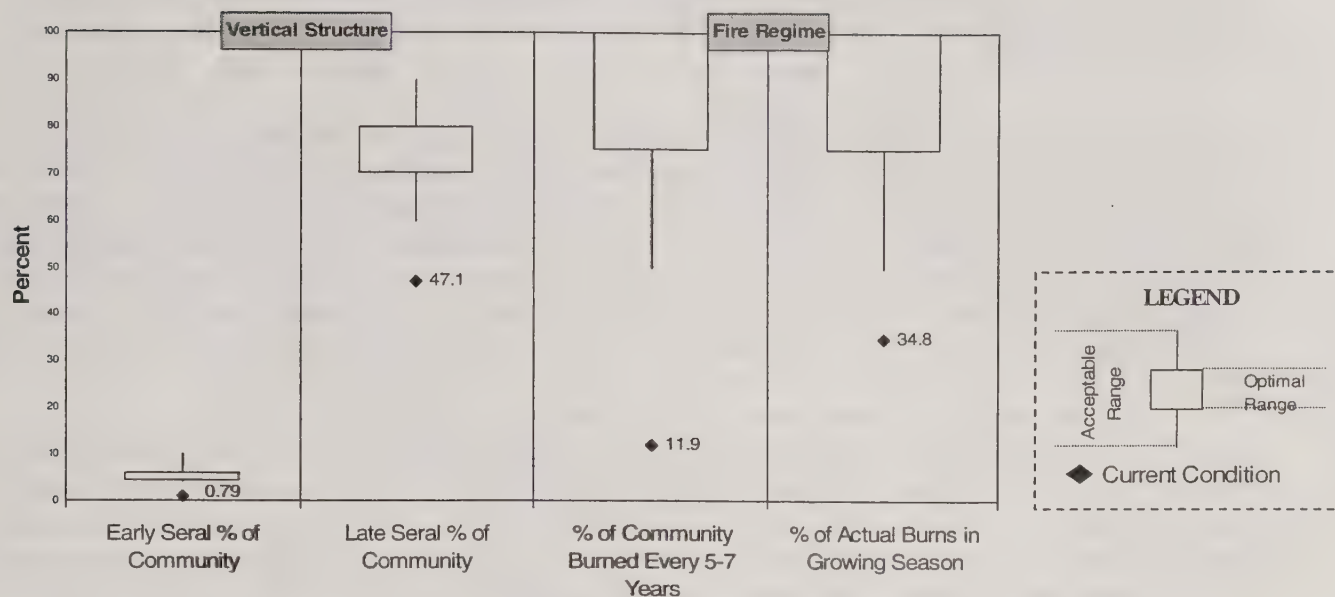


Figure 3.16 Vertical Structure and Fire Regime Condition, Ouachita Dry-Mesic Oak Forest

Ouachita dry-mesic oak forests' grass/forb/shrub, immature and/or mature structure provides optimal habitat for two species considered in the SVE and three MIS, plus suitable habitat for 22 SVE species; this subsystem also provides suitable habitat for an additional MIS. The MIS are labeled in the following tabulation:

Species	Importance of Ouachita Dry-Mesic Oak Forest
Southern Redback Salamander (<i>Plethodon serratus</i>)	Optimal
Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS	
Scarlet Tanager (<i>Piranga olivacea</i>) MIS	
American Burying Beetle (<i>Nicrophorus americanus</i>)	
White-tailed Deer (<i>Odocoileus virginianus</i>) MIS	
Mole Salamander (<i>Ambystoma talpoideum</i>)	Suitable
Caddo Mountain Salamander (<i>Plethodon caddoensis</i>)	
Fourche Mountain Salamander (<i>Plethodon fourchensis</i>)	
Kiamichi Mountain Salamander (<i>Plethodon kiamichi</i>)	
Sequoyah Slimy Salamander (<i>Plethodon sequoyah</i>)	
Chuck-will's-widow (<i>Caprimulgus carolinensis</i>)	
Whip-poor-will (<i>Caprimulgus vociferus</i>)	
Worm-eating Warbler (<i>Helmitheros vermivorus</i>)	
Wood Thrush (<i>Hylocichla mustelina</i>)	
Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS	
Kentucky Warbler (<i>Oporornis formosus</i>)	
White-eyed Vireo (<i>Vireo griseus</i>)	
Hooded Warbler (<i>Wilsonia citrina</i>)	
Diana Fritillary (<i>Speyeria diana</i>)	
Indiana Bat (<i>Myotis sodalis</i>)	
Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>)	
Ozark Chinquapin (<i>Castanea pumila</i> var <i>ozarkensis</i>)	
A Goldenrod (<i>Solidago ouachitensis</i>)	
A Twistflower (<i>Streptanthus squamiformis</i>)	
Ozark Least Trillium (<i>Trillium pusillum</i> var <i>ozarkanum</i>)	
Timber Rattlesnake (<i>Crotalus horridus</i>)	
Great Plains Skink (<i>Eumeces obsoletus</i>)	

Species	Importance of Ouachita Dry-Mesic Oak Forest
Southern Prairie Skink (<i>Eumeces septentrionalis obtusirostris</i>)	

Vertical Structure

The diversity of vertical structure, representing vegetation successional or seral stages (early seral-grass/forb/shrub, mid seral-immature forest and woodland, late seral-mature forest and woodland), is frequently the determining factor for the presence, distribution, and abundance of wildlife and plant species. Species are often obligate or dependent on certain vegetation structural conditions regardless of the community composition. To some species, the grass/forb shrub condition or early seral stage is critical; for others, the immature and/or mature condition is most important. Of particular importance are those forest conditions at the early and mature stages of the successional continuum (grass/forb shrub or early seral, and mature trees or late seral).

The early seral vertical structure condition is highly productive in terms of diversity and abundance of nesting and escape cover and forage production, including insects, small mammals, reptiles, seeds, and soft mast. Some plant species may need a certain amount of direct sunlight, while others may require shaded conditions. The early seral condition has an ephemeral lifespan of only up to 10 years, and is often in short and/or declining supply.

Early seral vertical structure conditions provide obligate habitat for two species, optimal habitat for seven species, and suitable habitat for four species considered in the SVE. Several MIS also find optimal or suitable habitat in the early seral structural condition, as shown in the following tabulation (MIS that were evaluated within the SVE are labeled "SVE/MIS").

Species	Importance of Grass-Forb/Seedling-Sapling
Prairie Warbler (<i>Dendroica discolor</i>) SVE/MIS A Twistflower (<i>Streptanthus squamiformis</i>)	Obligate
American Kestrel (<i>Falco sparverius</i>) White-eyed Vireo (<i>Vireo griseus</i>) Orchard Oriole (<i>Icterus spurius</i>) Painted Bunting (<i>Passerina ciris</i>) Northern Bobwhite (<i>Colinus virginianus</i>) SVE/MIS Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS Diana Fritillary (<i>Speyeria diana</i>) American Burying Beetle (<i>Nicrophorus americanus</i>) Southern Prairie Skink (<i>Eumeces septentrionalis obtusirostris</i>)	Optimal
Bewick's Wren (<i>Thryomanes bewickii</i>) White-tailed Deer (<i>Odocoileus virginianus</i>) MIS Western Diamondback Rattlesnake (<i>Crotalus atrox</i>) Timber Rattlesnake (<i>Crotalus horridus</i>) Great Plains Skink (<i>Eumeces obsoletus</i>)	Suitable

Vegetation communities that, through naturally limiting factors such as elevation, rainfall, aspect, slope, and thin soils, maintain primarily an early seral condition include acidic cliff and talus, acidic glades and barrens, and novaculite glade and woodland. Montane oak naturally provides a high elevation shrub condition. Herbaceous groundcover and shrubby vegetation cover the calcareous prairie and are interspersed throughout dry oak and pine-oak and pine-bluestem woodlands. A frequent to occasional fire treatment is essential to discourage the woody encroachment and to maintain the early seral condition within these systems. Overall current SVE condition score for the early seral habitat is 2.50 ("Fair").

Direct and Indirect Effects

The most prominent communities within the Ouachita National Forest—pine-oak forests, pine-oak woodlands, shortleaf pine-bluestem woodlands, WGCP pine-hardwood forests and dry-mesic oak forests—are slated for the most active management regimes. Vegetation management activities will include even-aged (modified seedtree and shelterwood) and uneven-aged regeneration harvest, thinning, and prescribed fire. Communities will be managed to provide for diversity of vertical structure as well as consideration of the value of contiguous communities, which means that some woodland conditions may revert to forest condition, while some forest will be restored to woodland conditions to allow for a more contiguous habitat. Figures 3.17 and 3.18 compare early seral habitat by alternative by community at the 10th and 50th year, respectively, of Plan implementation.

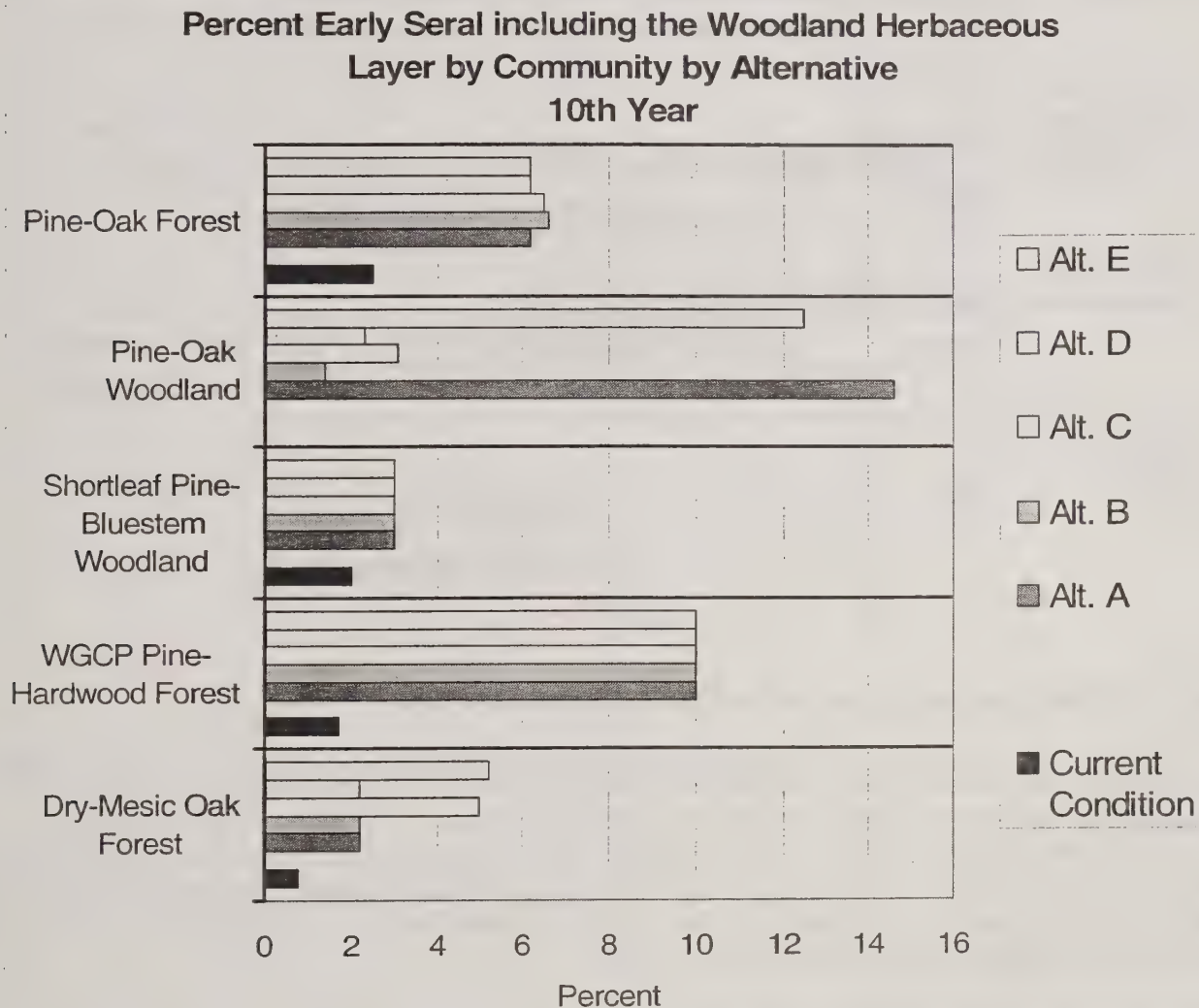


Figure 3.17 Early Seral Habitat by Alternative by Community at the 10th Year

**Percent Early Seral including the Woodland Herbaceous Layer
by Community by Alternative
50th Year**

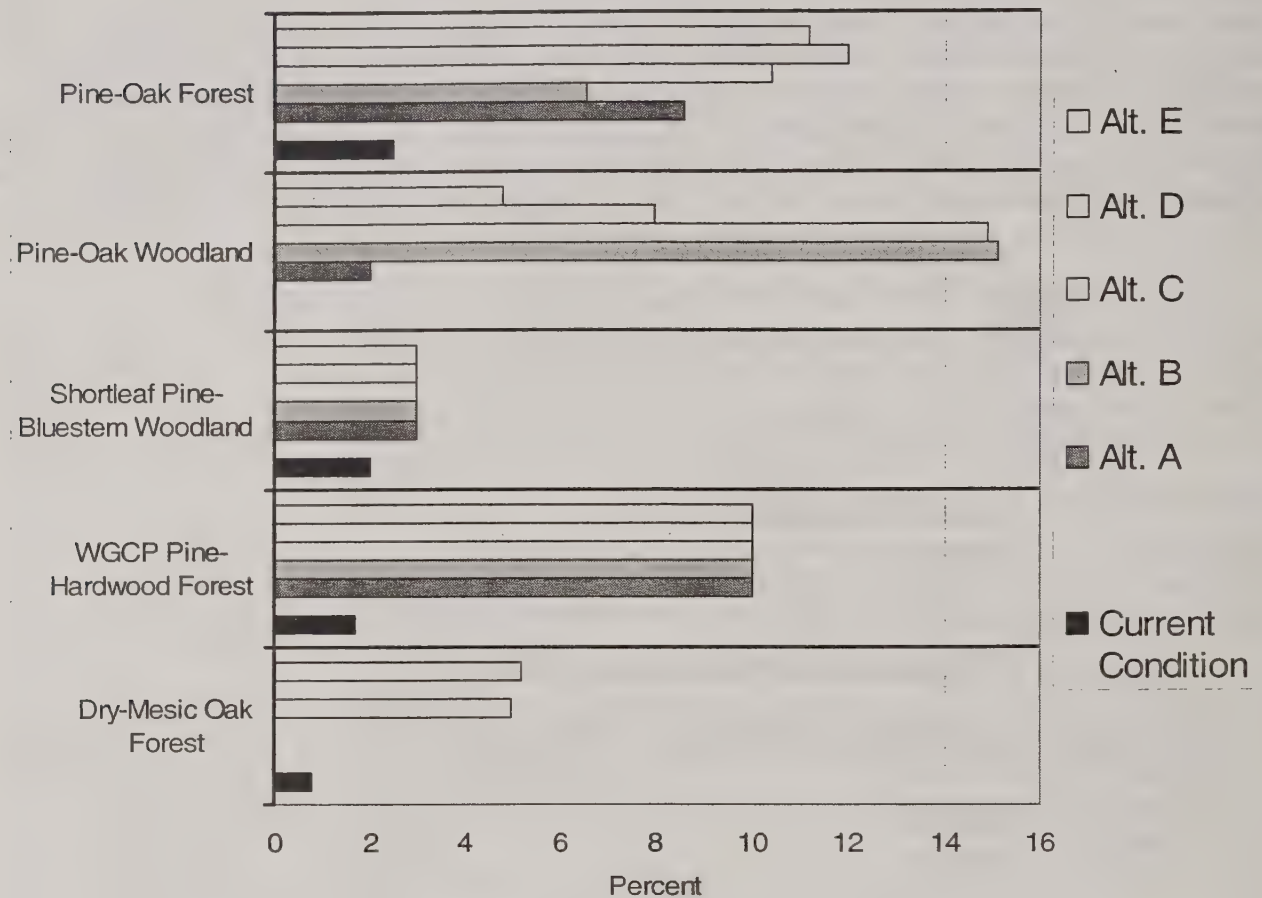


Figure 3.18 Early Seral Habitat by Alternative by Community at the 50th Year

The mid-seral vertical structure condition is perhaps the least beneficial to wildlife species. The closed canopy prevents sunlight from reaching the forest floor, limiting the development of herbaceous groundcover and shrubby understory. This condition does provide some foraging and cover for some species. For the majority of wildlife, this vertical structure condition provides lower quality habitat than early or late seral stages, although a few species do prefer mid-seral conditions, such as hooded warbler and worm-eating warbler.

The late seral vertical structure condition provides habitat for a suite of habitat specialists as well as habitat generalists. According to the September 2003 Continuous Inventory of Stand Conditions database used for this analysis, approximately 62 percent of the Forest is in the mature vertical structure condition. This condition provides important habitat for high canopy nesting and roosting, suitable structure for cavity development and excavation, and relatively large volumes of seed and hard mast. Components of this condition include snags, large and small diameter hollow trees as den trees, downed woody debris, and large trees near water that provide critical habitat for many wildlife species. Figures 3.19 and 3.20 compare late seral habitat by alternative by community at the 10th and 50th year, respectively.

Percent Late Seral by Community by Alternative 10th Year

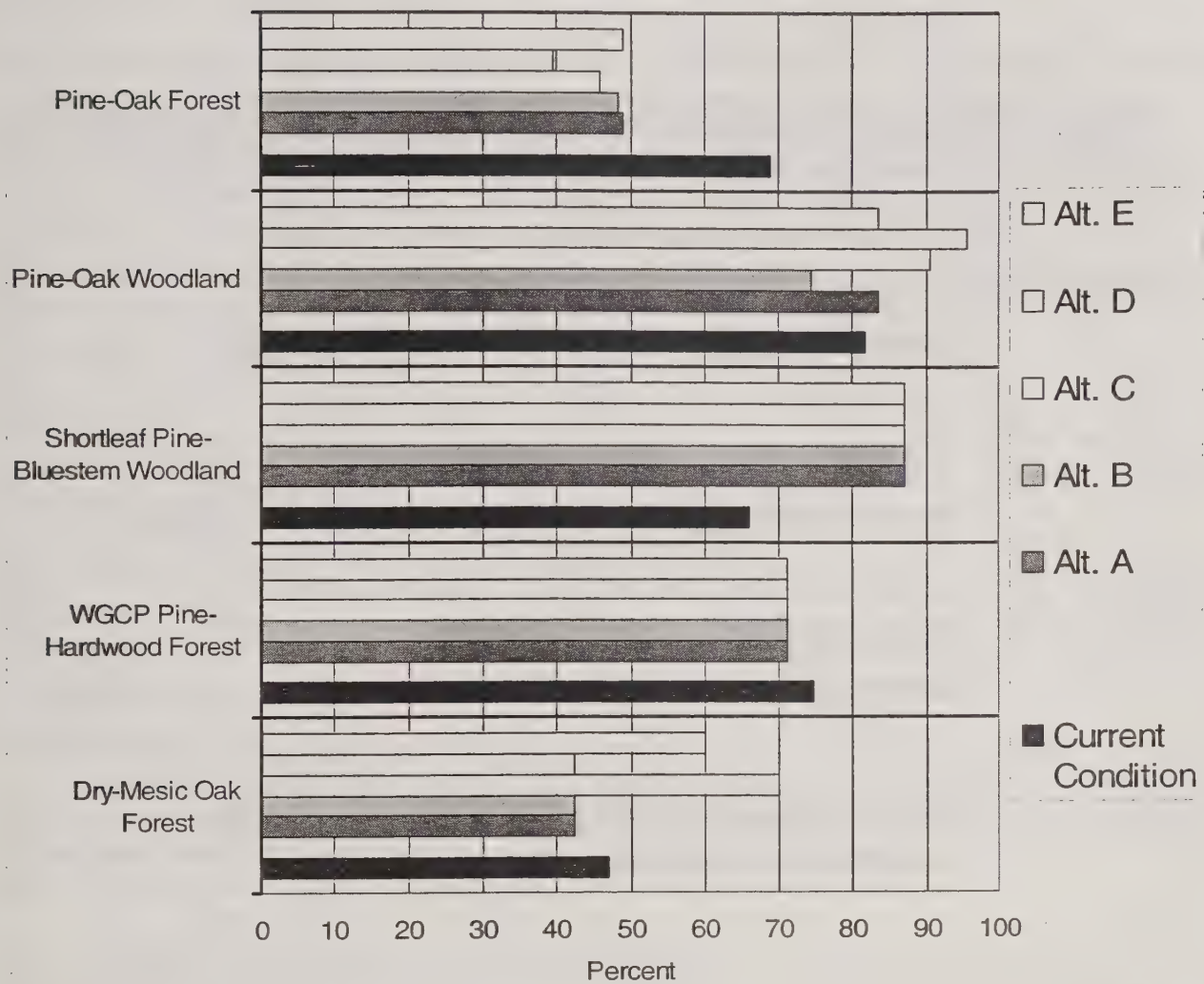


Figure 3.19 Late Seral Habitat by Alternative by Community at the 10th Year

Percent Late Seral by Community by Alternative 50th Year

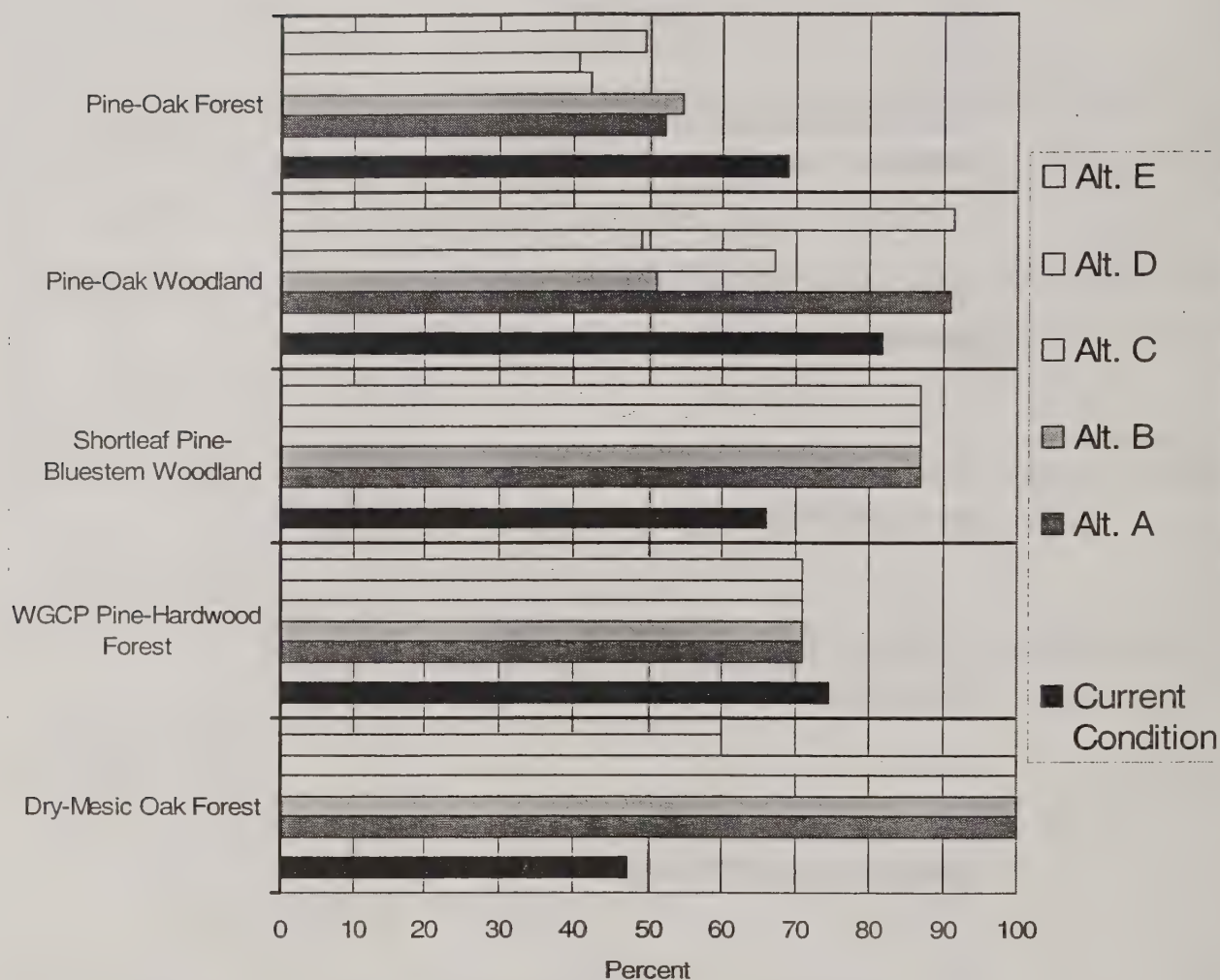


Figure 3.20 Late Seral Habitat by Alternative by Community at the 50th Year

The Ouachita pine-oak forests, pine-oak woodlands, pine-bluestem woodlands, WGCP pine-hardwood forests, and Ouachita dry-mesic oak forests are identified under all alternatives to be managed, restored, and maintained as habitat diversity emphasis communities. The future distribution of these communities on the Forest will vary among alternatives in relation to management intensity as in the number of acres treated annually. Pine-bluestem restoration efforts will be accomplished as a priority, restoring the pine-bluestem community to those appropriate areas that have converted to pine-oak forest. A wealth of research data has been compiled and published (see http://www.fs.fed.us/r8/ouachita/natural-resources/pine_lit_review.shtml for a listing) concerning the shortleaf pine-bluestem grass ecosystem, especially regarding the responses of native plants and animals to the thinning and prescribed burning necessary to restore and maintain this fire-adapted system.

The ability to use prescribed burning as a tool will play a critical role in restoring natural species assemblages and forest or woodland structure within the pine-oak communities and the dry-mesic hardwood forests. Table 3.40 presents estimated annual average acres of prescribed fire by alternative. Future age-class distributions and vertical structure will vary among alternatives due to

differences in management intensity and emphasis. Longer rotation ages along with frequent prescribed fire will enhance certain habitat attributes, such as the herbaceous ground cover and standing snags that are important to many species of viability concern, as well as demand and management indicator species.

Table 3.40 Estimated Annual Average Acres of Prescribed Fire, by Community, by Alternative

Community Name	A	B	C	D	E
Ouachita Pine-Oak Forest	36,420	66,578	117,228	50,000	87,234
Ouachita Pine-Oak Woodland	8,568	18,000	61,698	25,000	39,123
Shortleaf Pine/Bluestem Woodland	5,945	22,000	25,000	10,500	23,500
WGCP Pine-Hardwood Forest	1,003	1,500	1,945	80	1,744
Ouachita Dry – Mesic Oak Forest	7,812	12,800	35,545	11,000	21,412
Mesic Hardwood	13	75	1,051	500	928
Montane Oak	378	755	937	350	802
Dry Oak Woodlands	189	375	803	400	710
Novaculite Glade & Woodlands	6	30	503	250	359
Acidic Cliff & Talus	189	216	870	400	850
Acidic Glades & Barrens	126	201	525	250	525
Calcareous Prairie	35	70	71	70	63
Riparian Systems MA9	2,316	2,400	3,824	1,200	2,750
Total Acres	68,000	125,000	250,000	100,000	180,000

Some mortality of individual associated plants and animals could occur as a result of restoration and/or maintenance activities. The benefits to those species by managing and/or restoring the habitat will far outweigh those few casualties. Short-term negative effects to individual plants and animals are expected to be minimal and discountable compared to the long-term positive effects of habitat restoration.

Age-class distribution (vertical structure) varies some by community age-rotation criteria, with thinned stands managed towards long rotations with frequent fire intervals. As restoration, management and maintenance activities proceed within these communities, the importance of these habitats to species of regional as well as local viability concern will increase. Cumulatively, the effects of restoration, management and maintenance in the natural communities previously described, are expected to be critical to the sustainability of these habitats and the viability of the associated species. Figures 3.21 and 3.22 compare viability scores for common natural communities by alternative at the 10th and 50th year, respectively.

Viability Score for Common Natural Communities by Alternative 10th Year

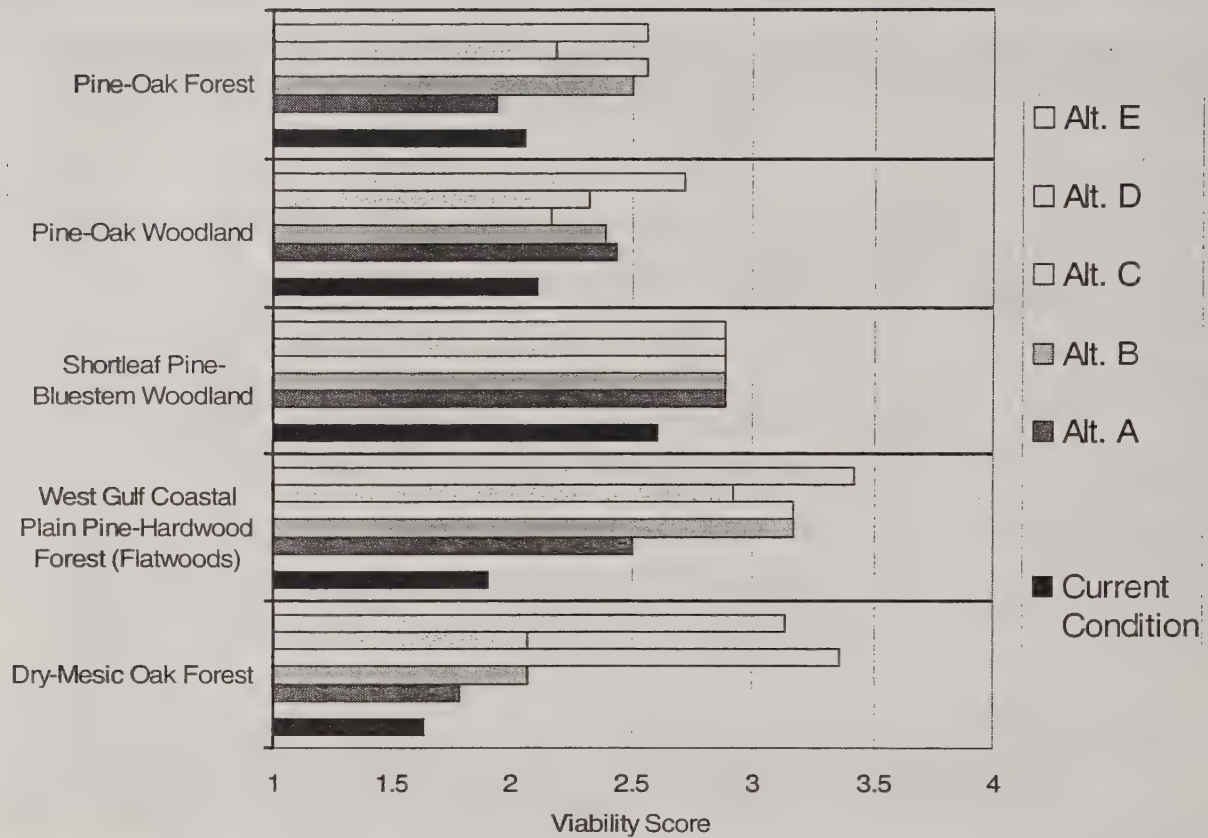


Figure 3.21 Viability Scores for Common Natural Communities by Alternative at the 10th Year

Viability Score for Common Natural Communities by Alternative 50th Year

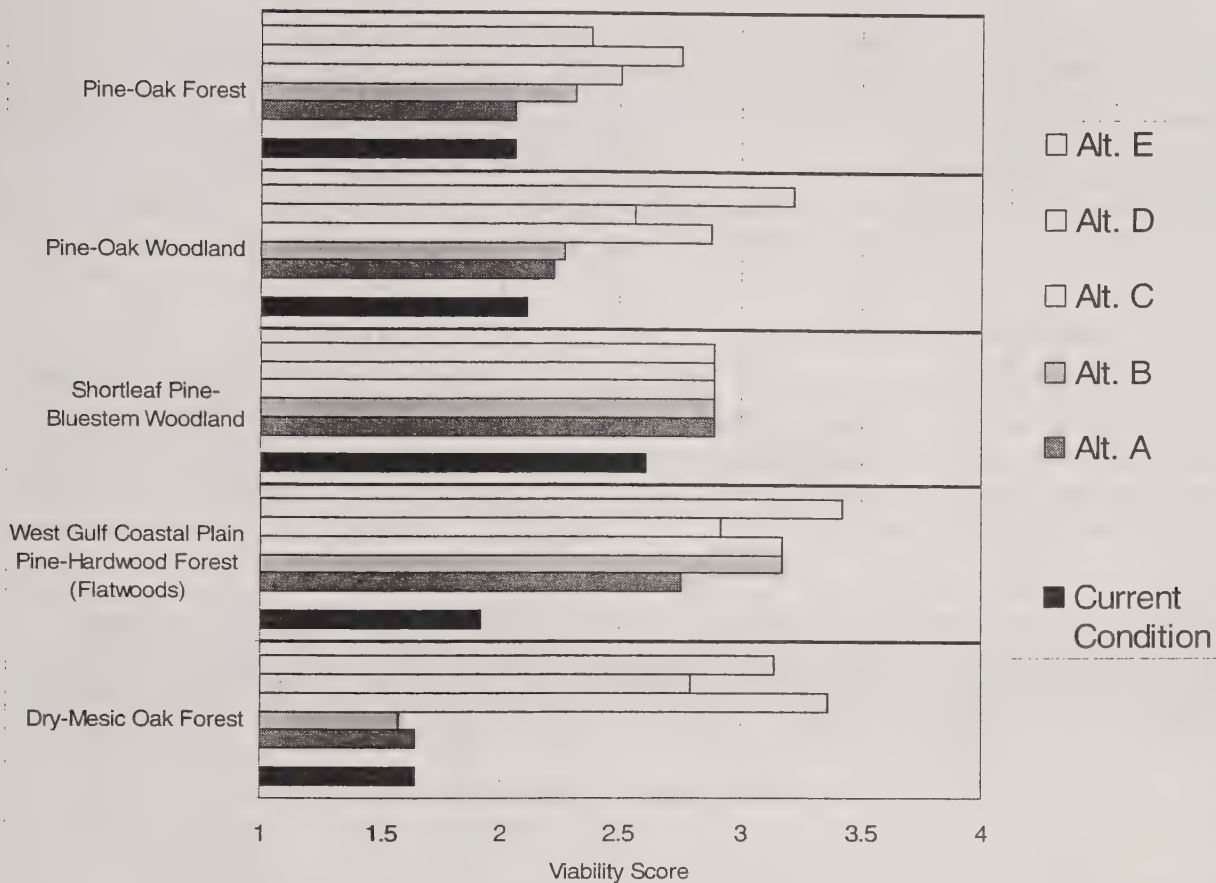


Figure 3.22 Viability Scores for Common Natural Communities by Alternative at the 50th Year

Vegetation management activities within the pine-oak forest and woodland, and dry-mesic oak forest vary in intensity among the alternatives. Vegetation management activities within the shortleaf pine-bluestem woodland system are directly responsive to the needs of the federally Endangered Red-cockaded Woodpecker and will be consistent across all alternatives.

There is high value in the large areas of continuous habitat, which means that some woodland will be allowed to revert to forested conditions, while some forest will be restored to woodland conditions. As pine, pine-oak, and dry-mesic oak forests and/or woodlands are prevalent on the Forest, management opportunities should ensure the continued persistence of these communities with a management focus on maintenance and restoration of native communities and species assemblages.

Cumulative Effects

Through time, Alternatives A and B would result in the least benefit to the pine-oak forest and woodlands and the dry-mesic oak forest. Alternative D would result in the greatest benefit to the pine-oak forest, but lower benefits for the pine-oak woodland and dry-mesic oak forest. Alternative C would result in a lower emphasis on the pine-dominated systems, but a slightly greater improvement within the dry-mesic oak forest. Alternative E would result in the best health

prescription for the pine-dominated systems and considerable improvement of the dry-mesic oak forest.

Rare Upland Communities

Together, the relatively rare upland communities described in this section comprise approximately 3.3 percent of the total Forest area. These systems are generally small, isolated, and/or disjunct and are generally "embedded" in a larger landscape matrix. These communities are maintained primarily through naturally occurring circumstances such as elevation, soil moisture conditions, and soil productivity. Historically, wildfire was a major influence in all but the mesic hardwood forest; decades of fire suppression and human-influenced changes in fuel loads and fire behavior in Ouachita National Forest System landscapes have altered all of the other rare upland communities.

Ouachita Mesic Hardwood Forest

This system is found on toeslopes and in valley bottoms, as well as on north-facing and other protected slopes and ravines. Here, American beech may be the dominant tree species with codominants of red oak, sweetgum, American basswood, cucumbertree, or other mesic tree species. In some situations, sugar maple is dominant. Table 3.41 lists the key factors for Ouachita mesic hardwood forest current condition.

Table 3.41 Ouachita Mesic Hardwood Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	98	Very Good
Fire Frequency	Percent burned every 25-35 years	<25	25-50	51-75	>75	0.3	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<25	25-50	51-75	>75	57.3	Good
Remoteness	Road density in miles/mile ²	>2	1-2	0.5-1	<0.5	0.8	Good
Composite SVE Score is 2.50—Fair							

Overall SVE condition score for the mesic hardwood forests is 2.50 (Fair). The fire regime needed to support good/very good conditions is one in which at least 50 percent of the mesic hardwood forest community is burned every 25-35 years, with an occasional growing season burn included. The most recent fire history indicates that only 0.3 percent of this system is burned every 25-35 years, but 57.3 percent of the burned area received a growing season burn.

The grass/forb/shrub, immature and/or mature structure of the species-rich Ouachita mesic hardwood forests provides obligate habitat for one species, optimal habitat for 22 species, suitable habitat for 12 species, and marginal habitat for four species considered in the SVE; one of the "suitable" species is also an MIS. In addition to species considered in the SVE, two MIS find optimal habitat in this system (for at least part of their needs), and two MIS find suitable habitat here. In the following tabulation, the MIS are labeled (MIS that were evaluated as part of the SVE are labeled "SVE/MIS"):

Species	Importance of Ouachita Mesic Hardwood Forest
Ouachita Slitmouth Snail (<i>Stenotrema unciferum</i>)	Obligate
Mole Salamander (<i>Ambystoma talpoideum</i>) Ringed Salamander (<i>Ambystoma annulatum</i>) Four-toed Salamander (<i>Hemidactylium scutatum</i>) Southern Redback Salamander (<i>Plethodon serratus</i>) Sequoyah Slimy Salamander (<i>Plethodon sequoyah</i>) Rich Mountain Salamander (<i>Plethodon ouachitae</i>) Kiamichi Mountain Salamander (<i>Plethodon kiamichi</i>) Fourche Mountain Salamander (<i>Plethodon fourchensis</i>) Caddo Mountain Salamander (<i>Plethodon caddoensis</i>) Hooded Warbler (<i>Wilsonia citrina</i>) White-eyed Vireo (<i>Vireo griseus</i>) Whip-poor-will (<i>Caprimulgus vociferus</i>) Scarlet Tanager (<i>Piranga olivacea</i>) MIS Kentucky Warbler (<i>Oporornis formosus</i>) Wood Thrush (<i>Hylocichla mustelina</i>) Worm-eating Warbler (<i>Helmitheros vermivorus</i>) Acadian Flycatcher (<i>Empidonax virescens</i>) Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS Cerulean Warbler (<i>Dendroica cerulea</i>) American Burying Beetle (<i>Nicrophorus americanus</i>) Moore's Larkspur (<i>Delphinium newtonianum</i>) Ozark Least Trillium (<i>Trillium pusillum</i> var <i>ozarkanum</i>) Ozark Spiderwort (<i>Tradescantia ozarkana</i>) A Goldenrod (<i>Solidago ouachitensis</i>)	Optimal
Yellow-throated Vireo (<i>Vireo flavifrons</i>) Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS Swainson's Warbler (<i>Limnothlypis swainsonii</i>) Prairie Warbler (<i>Dendroica discolor</i>) SVE/MIS Chimney Swift (<i>Chaetura pelagica</i>) Chuck-will's-widow (<i>Caprimulgus carolinensis</i>) Diana Fritillary (<i>Speyeria diana</i>) Indiana Bat (<i>Myotis sodalis</i>) Eastern Small-Footed Bat (<i>Myotis leibii</i>) White-tailed Deer (<i>Odocoileus virginianus</i>) MIS Butternut (<i>Juglans cinerea</i>) Browne's Waterleaf (<i>Hydrophyllum brownei</i>) Ouachita Bluet (<i>Houstonia ouachitana</i>) Ozark Chinquapin (<i>Castanea pumila</i> var <i>ozarkensis</i>) Waterfall's Sedge (<i>Carex latebracteata</i>)	Suitable
Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>) Rayless Crown-Beard (<i>Verbesina walteri</i>) A Corn-Salad (<i>Valerianella palmeri</i>) Ouachita Leadplant (<i>Amorpha ouachitensis</i>)	Marginal

Ouachita Dry Oak Woodland

This system occurs in the Ozark and Ouachita Highlands and far western portions of the Interior Low Plateau regions along gentle to steep slopes and over bluff escarpments with southerly to westerly aspects. Parent material can range from calcareous to acidic. Soils are very shallow and mostly well-drained to excessively well-drained; some soils have a fragipan that causes wide fluctuations in moisture conditions. This system was historically woodland in structure, composition, and process but now includes areas of more closed canopy forests due to fire suppression. Oak species dominate this system with a herbaceous ground cover component. Drought stress and

associated landscape fire are the major natural influences on this system. Table 3.42 lists the key factors for Ouachita dry oak woodland current condition.

Table 3.42 Ouachita Dry Oak Woodland Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Score and Rating
Fire Frequency	Percent burned every 5-7 years	<25	25-50	51-75	>75	22.9	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<20	20-40	41-70	>70	65.6	Good
Remoteness	Road density in miles/mile ²	>2	1-2	0.5-1	<0.5	2.02	Poor
Vertical Structure	Percent Early Seral (Grass/Forb/Shrub)	<2 or >14	2-4 or 10-14	7-10	4-6	1.8 (85 acres)	Poor
Vertical Structure	Percent Mid-Seral (Immature Woodland)	<10 or >45	10-15 or 35-45	15-20 or 30-35	20-30	76.3 (3,630 acres)	Poor
Vertical Structure	Percent Late Seral (Mature Woodland)	<50 or >95	50-60 or 91-95	60-70 or 81-90	70-80	22 (1,045 acres)	Poor
Percent herbaceous ground coverage	Percent of dry oak woodlands supporting a grass/forb layer	<25	25-40	41-75	>75	23.8 (503 acres)	Poor
Composite SVE Score is 1.17 - Poor							

Overall SVE condition score for Ouachita Dry Oak Woodland is 1.17 ("Poor"). The defining characteristic of this subsystem is that the canopy closure should be less than 70 percent; it is currently near 90 percent. Based on the SVE, the vertical structure needed to support good/very good conditions is 4-10 percent in grass/forb seral stage and 60-90 percent in the mature woodland condition. Current condition is 1.8 percent in grass/forb seral stage and 22 percent in the mature woodland condition. Recent oak decline has influenced the vertical structure of this system to a great extent.

Based on the SVE, the fire regime needed to support good/very good conditions is one in which at least 50 percent of the dry oak woodland community is burned every 5-7 years, with an occasional growing season burn included. The current fire history reflects that 22.9 percent of the dry oak woodlands system is burned every 5-7 years, and 65.6 percent of the burned area receives an occasional growing season burn. Figure 3.23 presents vertical structure and fire regime condition for the Ouachita dry oak woodland community.

Ouachita Dry Oak Woodland

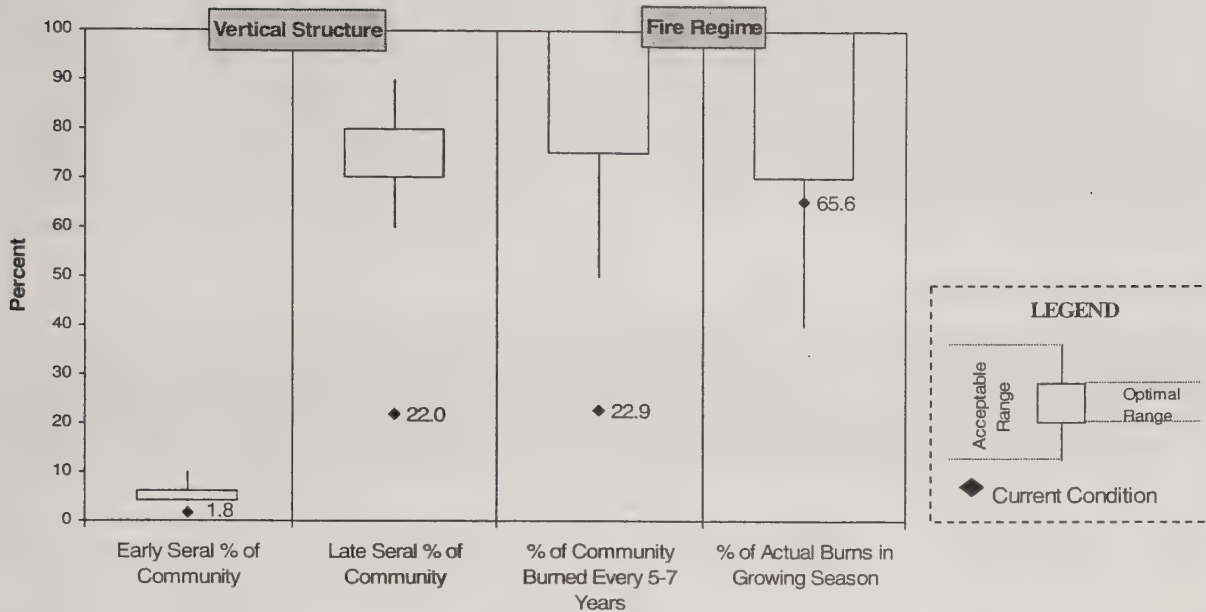


Figure 3.23 Vertical Structure and Fire Regime Condition, Ouachita Dry Oak Woodland

The grass/forb/shrub, immature and/or mature structure of Ouachita Dry Oak Woodland provides optimal habitat for five species, suitable habitat for 12 species, and marginal habitat for two species considered in the SVE. One "optimal" category species and one "suitable" category species are also MIS. Additional (non-SVE) management indicator species studied include three for which Ouachita Dry Oak Woodland is optimal habitat and one for which it is suitable habitat. In the following tabulation, the MIS are labeled (MIS that were evaluated as part of the SVE are labeled "SVE/MIS"):

Species	Importance of Ouachita Dry Oak Woodland
Prairie Warbler (<i>Dendroica discolor</i>) SVE/MIS Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS Scarlet Tanager (<i>Piranga olivacea</i>) MIS Bewick's Wren (<i>Thryomanes bewickii</i>) American Burying Beetle (<i>Nicrophorus americanus</i>) Indiana Bat (<i>Myotis sodalis</i>) White-tailed Deer (<i>Odocoileus virginianus</i>) MIS Southern Prairie Skink (<i>Eumeces septentrionalis obtusirostris</i>)	Optimal
Bachman's Sparrow (<i>Aimophila aestivalis</i>) Chuck-will's-widow (<i>Caprimulgus carolinensis</i>) Whip-poor-will (<i>Caprimulgus vociferus</i>) Northern Bobwhite (<i>Colinus virginianus</i>) SVE/MIS Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS American Kestrel (<i>Falco sparverius</i>) Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>) Eastern Small-Footed Bat (<i>Myotis leibii</i>) Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>) Bush's Poppymallow (<i>Callirhoe bushii</i>) Ozark Chinquapin (<i>Castanea pumila var ozarkensis</i>) Timber Rattlesnake (<i>Crotalus horridus</i>) Great Plains Skink (<i>Eumeces obsoletus</i>)	Suitable
Ozark Least Trillium (<i>Trillium pusillum var ozarkanum</i>) Western Diamondback Rattlesnake (<i>Crotalus atrox</i>)	Marginal

Ouachita Montane Oak Forest

This system represents oak-dominated forests of the highest elevations in the Ouachita Mountains. Canopy trees are often stunted due to the effects of ice, wind and cold conditions, in combination with shallow, rocky soils, fog, occasional fire, and periodic severe drought. Some stands form almost impenetrable thickets ("elfin forests"). The current vertical structure condition is a self-maintaining scrubby or stunted, oak-dominated system maintained by naturally occurring processes and, when needed, prescribed fire. Table 3.43 lists the key factors for Ouachita montane oak forest current condition.

Table 3.43 Ouachita Montane Oak Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 10 years	<25	25-50	51-75	>75	1.67	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<25	25-50	51-75	>75	67.7	Good
Remoteness	Road density in miles/mile ²	>2	1-2	0.5-1	<0.5	0.75	Good
Composite SVE Score is 2.0 - Fair							

Overall SVE condition score for Ouachita Montane Oak Forest is 2.0 ("Fair"). The fire regime needed to support good/very good conditions is one in which at least 50 percent of the montane oak forest community is burned every 10 years, with an occasional growing season burn included. The current fire history reflects that less than 2 percent of the montane oak forest community is burned every 10 years, and 67.7 percent of the burned area receives an occasional growing season burn.

Montane oak forests provide suitable habitat for two species considered in the SVE and two MIS; they provide optimal habitat (at least for some needs) for two MIS. MIS are labeled as such in the following tabulation:

Species	Importance of Ouachita Montane Oak Forest
Scarlet Tanager (<i>Piranga olivacea</i>) MIS White-tailed Deer (<i>Odocoileus virginianus</i>) MIS	Optimal
Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS Western Diamondback Rattlesnake (<i>Crotalus atrox</i>) Timber Rattlesnake (<i>Crotalus horridus</i>)	Suitable

Ouachita Novaculite Glade and Woodland

This system represents a mosaic of glades and woodlands found on novaculite substrates in the central Ouachita Mountains of western Arkansas. Novaculite is a weakly metamorphosed rock of sedimentary origin that is primarily composed of microcrystalline quartz and chalcedony. This system generally occupies ridgetops at 1,400 to 2,100 feet elevation in a mosaic of small

woodlands along ridges and upper slopes, with rock outcrops and patches of talus scattered throughout. Some glade/woodland patches may appear as nearly linear strips interspersed with grassy openings. Wooded patches have a variable, often patchy structure, with some areas of dense canopy interspersed with more open canopies and open grassy areas. In general, the grassy openings occur on shallow soils with exposed bedrock, while the woodlands occur on somewhat deeper soils. In all cases, these are extremely limiting growing conditions. The structure of this system is controlled by a combination of periodic fire and severe drought. Based on the SVE, naturally limiting factors and prescribed fire are necessary to maintain the open glade/woodland vertical structure in good/very good conditions. Table 3.44 lists the key factors for Ouachita novaculite glade and woodland current condition.

Table 3.44 Ouachita Novaculite Glade and Woodland Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 3-5 years	<25	25-50	51-75	>75	0.3	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<25	25-50	51-75	>75	82.8	Very Good
Remoteness	Road density in miles/mile ²	>2	1-2	0.5-1	<0.5	0	Very Good
Composite SVE Score is 2.5 - Fair							

Overall SVE condition score for Ouachita Novaculite Glade and Woodland is 2.5 ("Fair"). The most recent fire history revealed that only 0.3 percent of the community has been burned every 3-5 years, which indicates that the community is actually in "poor" overall condition. Of the burned area, 82.8 percent did receive the occasional growing season burn. Figure 3.24 presents fire regime condition for the Ouachita novaculite glade and woodland community.

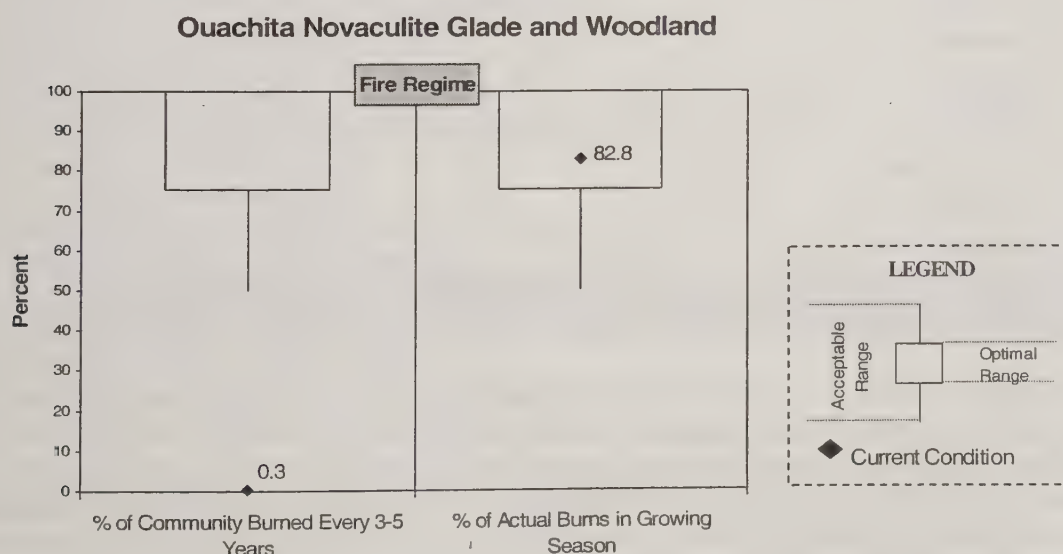


Figure 3.24 Vertical Structure and Fire Regime Condition, Ouachita Novaculite Glade and Woodland

Ouachita Novaculite Glade and Woodland provide obligate habitat for one species, optimal habitat for two species, and suitable habitat for three species considered in the SVE. Two MIS find suitable (albeit, relatively minor) habitat here. MIS are labeled in the following tabulation:

Species	Importance of Ouachita Novaculite Glade
Heartleaf Leafcup (<i>Polymnia cossatotensis</i>)	Obligate
Waterfall's Sedge (<i>Carex latebracteata</i>) A Twistflower (<i>Streptanthus squamiformis</i>)	Optimal
Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS Diana Fritillary (<i>Speyeria diana</i>) White-tailed Deer (<i>Odocoileus virginianus</i>) MIS Western Diamondback Rattlesnake (<i>Crotalus atrox</i>) Timber Rattlesnake (<i>Crotalus horridus</i>)	Suitable

Central Interior Highlands Dry Acidic Glades and Barrens

This system is found in the Interior Highlands of the Ozark, Ouachita, and Interior Low Plateau regions, occurring along moderate to steep slopes or valley walls of rivers along most aspects. Parent material includes chert, igneous and/or sandstone bedrock with well-drained to excessively well-drained, shallow soils interspersed with rock and boulders. These soils are typically dry during the summer and autumn, but are often saturated during the spring and winter. Grasses dominate this system, with stunted oak species and shrub species occurring on variable depth soils. This system is influenced by drought and infrequent to occasional fires. Based on the SVE, prescribed fire is needed to support the open glade vertical structure in good/very good conditions. Table 3.45 lists the key factors for the Central Interior Highlands dry acidic glades and barrens current condition.

Table 3.45 Central Interior Highlands Dry Acidic Glades and Barrens Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 5-10 years	<25	25-50	51-75	>75	23.8	Poor
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<30 or >90	30-50 or 86-90	51-70 or 81-85	71-80	57.3	Good
Remoteness	Road density in miles/mile ²	>2	1-2	0.5-1	<0.5	2.51	Poor
Composite SVE Score is 1.33 - Poor							

Overall SVE condition score for Central Interior Highlands Dry Acidic Glades and Barrens is 1.33 ("Poor"). The fire regime needed to support good/very good conditions is one in which 50-85 percent of the dry acidic glades and barrens system and a 100-meter buffer are burned every 5-10 years, with an occasional growing season burn included. The most recent fire history indicates that only 23.8 percent of this system is burned every 5-10 years, and 57.3 percent of the burned areas receive an occasional growing season burn. This system is frequently embedded within large-area

prescribed burns. Figure 3.25 presents fire regime condition for the central interior highlands dry acidic glades and barrens.

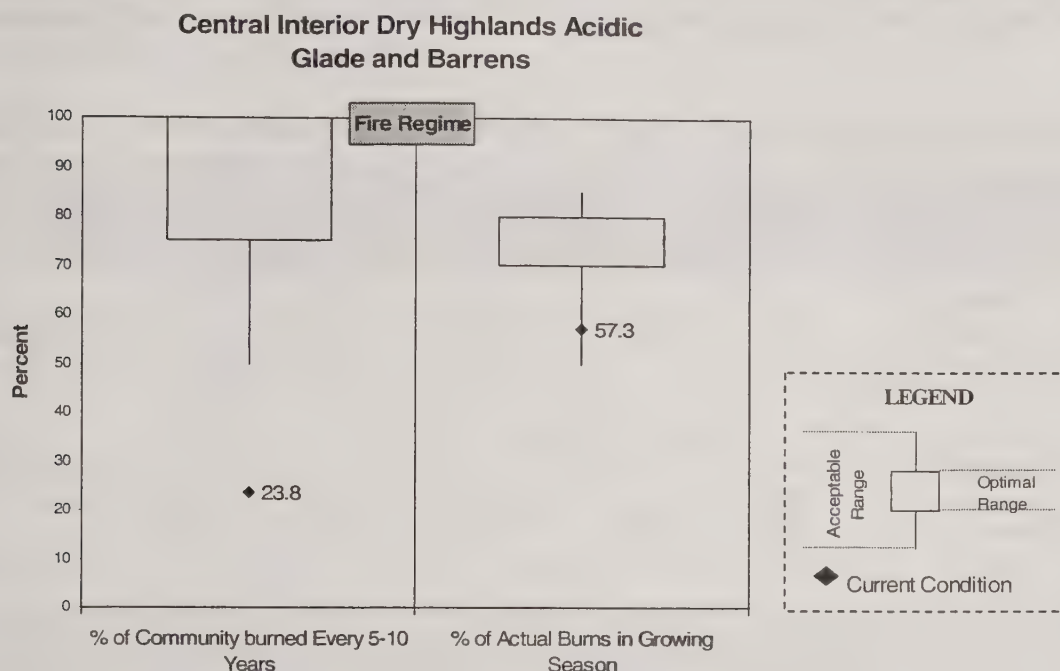


Figure 3.25 Fire Regime Condition, Central Interior Highlands Dry Acidic Glades and Barrens

Central interior highlands dry acidic glades and barrens provide obligate habitat for four species, optimal habitat for two species, and suitable habitat for nine species considered in the SVE. Two MIS find suitable (albeit, relatively minor) habitat here. The MIS are labeled as such in the following tabulation:

Species	Importance of Central Interior Highlands Dry Acidic Glades and Barrens
Open-ground Whitlow-grass (<i>Draba aprica</i>) Wolf Spikerush (<i>Eleocharis wolfii</i>) Small-headed Pipewort (<i>Eriocaulon kornickianum</i>) Nuttall's Corn-Salad (<i>Valerianella nuttallii</i>)	Obligate
A Corn-Salad (<i>Valerianella palmeri</i>) Collared Lizard (<i>Crotaphytus collaris</i>)	Optimal
Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS White-eyed Vireo (<i>Vireo griseus</i>) Diana Fritillary (<i>Speyeria diana</i>) White-tailed Deer (<i>Odocoileus virginianus</i>) MIS Waterfall's Sedge (<i>Carex latebracteata</i>) Shinners' Sunflower (<i>Helianthus occidentalis</i> ssp <i>plantagineus</i>) Maple-leaved Oak (<i>Quercus acerifolia</i>) Western Diamondback Rattlesnake (<i>Crotalus atrox</i>) Great Plains Skink (<i>Eumeces obsoletus</i>)	Suitable

Central Interior Highlands Acidic Cliff and Talus

This system is found primarily in the Interior (Ozark-Ouachita) Highlands and Interior Low Plateau ecoregions. Sandstone outcrops and talus ranging from moist to dry typify this system, which is usually sparsely vegetated; however, on moister sites with more soil development, several fern

species and sedges may become established. Wind, fire, and water erosion are the major forces influencing this system. Based on the SVE, an open, fire-maintained, herbaceous-dominated system with sparse woody vegetation is needed to support good/very good vertical structure conditions. Table 3.46 lists the key factors for Central Interior Highlands acidic cliff and talus current condition.

Table 3.46 Central Interior Highlands Acidic Cliff and Talus Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 5-7 years	<25	25-50	51-75	>75	3.6	Poor
Fire Seasonality	Percent of burns in growing season (March-Sept.)	<30 or >90	30-50 or 86-90	51-70 or 81-85	71-80	52.7	Good
Remoteness	Road density in miles/mile ²	>2	1-2	0.5-1	<0.5	0.91	Good
Composite SVE Score is 2.00 - Fair							

The overall SVE condition score for Central Interior Highlands Acidic Cliffs and Talus is 2.00 ("Fair"). The fire regime needed to support good/very good conditions is one in which 50-85 percent of the acidic cliff and talus system and a 100-meter buffer are burned every 5-7 years, with an occasional late growing season burn included. The most recent fire history indicates that only 3.6 percent of this system is burned every 5-7 years, and 52.7 percent of the prescribed burned area receives an occasional growing season burn. This system is frequently embedded within large area prescribed burns.

Central Interior Highlands Acidic Cliff and Talus provide obligate habitat for one species and suitable habitat for four species considered in the SVE. Two MIS find suitable (albeit, relatively minor) habitat here. MIS are labeled as such in the following tabulation:

Species	Importance of Central Interior Acidic Cliff and Talus
Rich Mountain Slitmouth Snail (<i>Stenotrema pilsbryi</i>)	Obligate
Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS	Suitable
White-eyed Vireo (<i>Vireo griseus</i>)	
Diana Fritillary (<i>Speyeria diana</i>)	
White-tailed Deer (<i>Odocoileus virginianus</i>) MIS	

Calcareous Prairie

This system includes natural grassland vegetation and associated woody vegetation in a relatively small natural region of the Upper West Gulf Coastal Plain of Oklahoma. Although other calcareous prairies are found west of the Mississippi River, this system represents some of the largest known and highest quality remaining examples. Plant communities in this system occur over relatively deep soils with circumneutral surface soil pH, which is unusual given the predominance of acidic, generally forested soils in the region. In most cases, individual prairie openings are small and isolated today but were probably more extensive prior to European settlement, forming a mosaic of

grassland and woodlands influenced by frequent fire. The flora has much in common with other Mississippi Embayment prairie systems as well as the classic midwestern prairies. Based on the SVE, an open, fire-maintained grassland system with sparse to absent woody vegetation is needed to support good/very good vertical structure conditions. Table 3.47 lists the key factors for calcareous prairie current condition.

Table 3.47 Calcareous Prairie Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 3-5 years	<25	25-50	51-75	>75	55	Good
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<25	25-50	51-75	>75	60	Good
Remoteness	Road density in miles/mile ²	>2	1-2	0.5-1	<0.5	0	Very Good
Composite SVE Score is 3.33 - Good							

Overall SVE condition score for Calcareous Prairie is 3.33 ("Good"). The fire regime needed to support good/very good conditions is one in which at least 50 percent of the calcareous prairie system and a 100-meter buffer are burned every 3-5 years, with an occasional growing season burn included. The most recent fire history reports that at least 55 percent of this system has been treated with prescribed fire twice in the last 10 years, and 60 percent of the burns were in the growing season.

Calcareous prairie provides obligate habitat for two species, optimal habitat for four species, and suitable habitat for three species considered in the SVE; of these, one of the "optimal" species is also an MIS. Two additional MIS find suitable (albeit, relatively minor) habitat here. In the following tabulation, the MIS are labeled; MIS that were evaluated as part of the SVE are labeled "SVE/MIS." Figures 3.27 and 3.28 present viability scores for rare upland communities by alternative at the 10th year and 50th year, respectively.

Species	Importance of Calcareous Prairie
Golden Glade Cress (<i>Leavenworthia aurea</i>) Arkansas Meadow-Rue (<i>Thalictrum arkansanum</i>)	Obligate
Prairie Warbler (<i>Dendroica discolor</i>) SVE/MIS American Kestrel (<i>Falco sparverius</i>) Painted Bunting (<i>Passerina ciris</i>) Threadleaf Bladderpod (<i>Lesquerella angustifolia</i>)	Optimal
Bachman's Sparrow (<i>Aimophila aestivalis</i>) Northern Bobwhite (<i>Colinus virginianus</i>) SVE/MIS White-tailed Deer (<i>Odocoileus virginianus</i>) MIS	Suitable

Viability Score for Rare Upland Communities by Alternative 10th Year

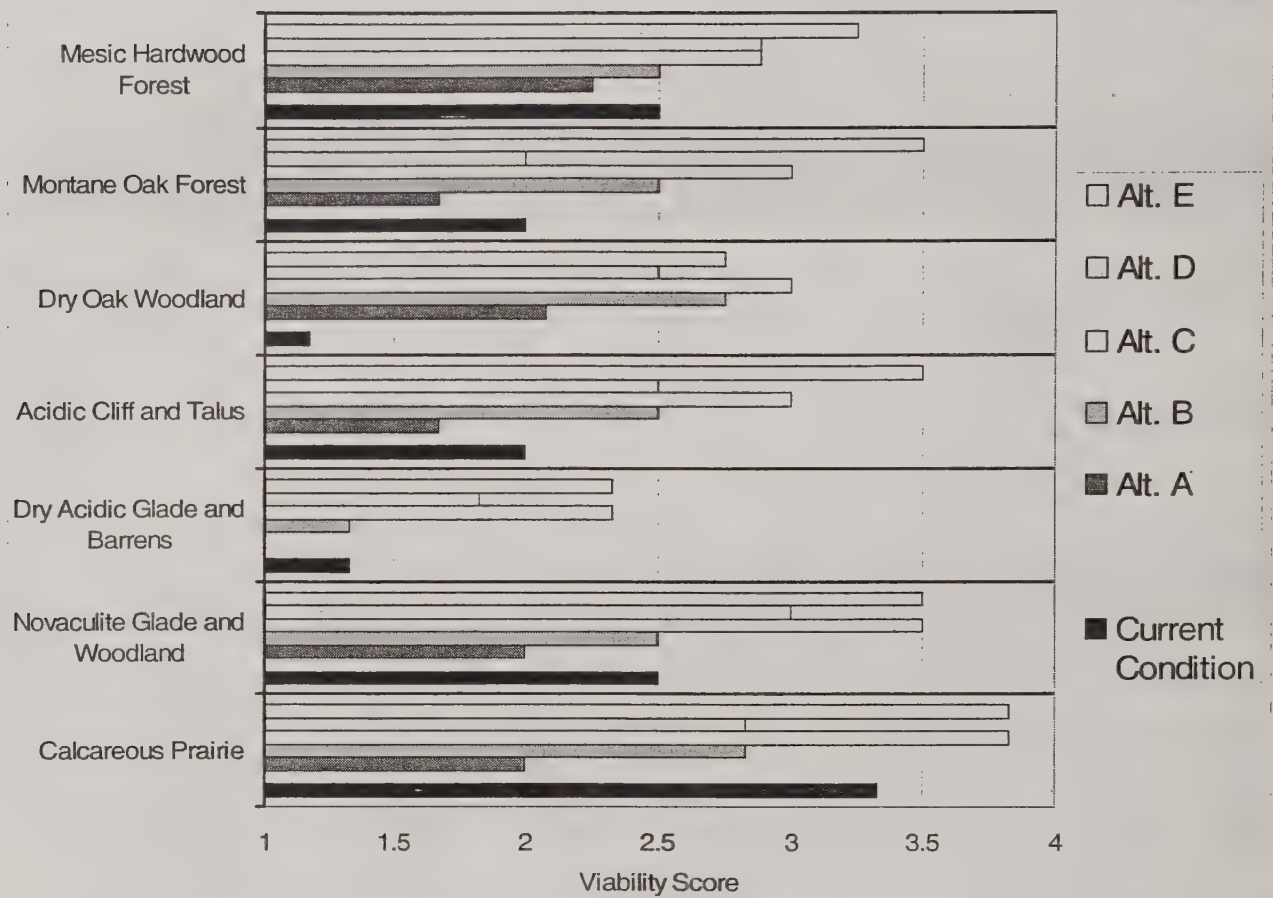


Figure 3.27 Viability Score for Rare Upland Communities by Alternative, 10th Year

Viability Score for Rare Upland Communities by Alternative 50th Year

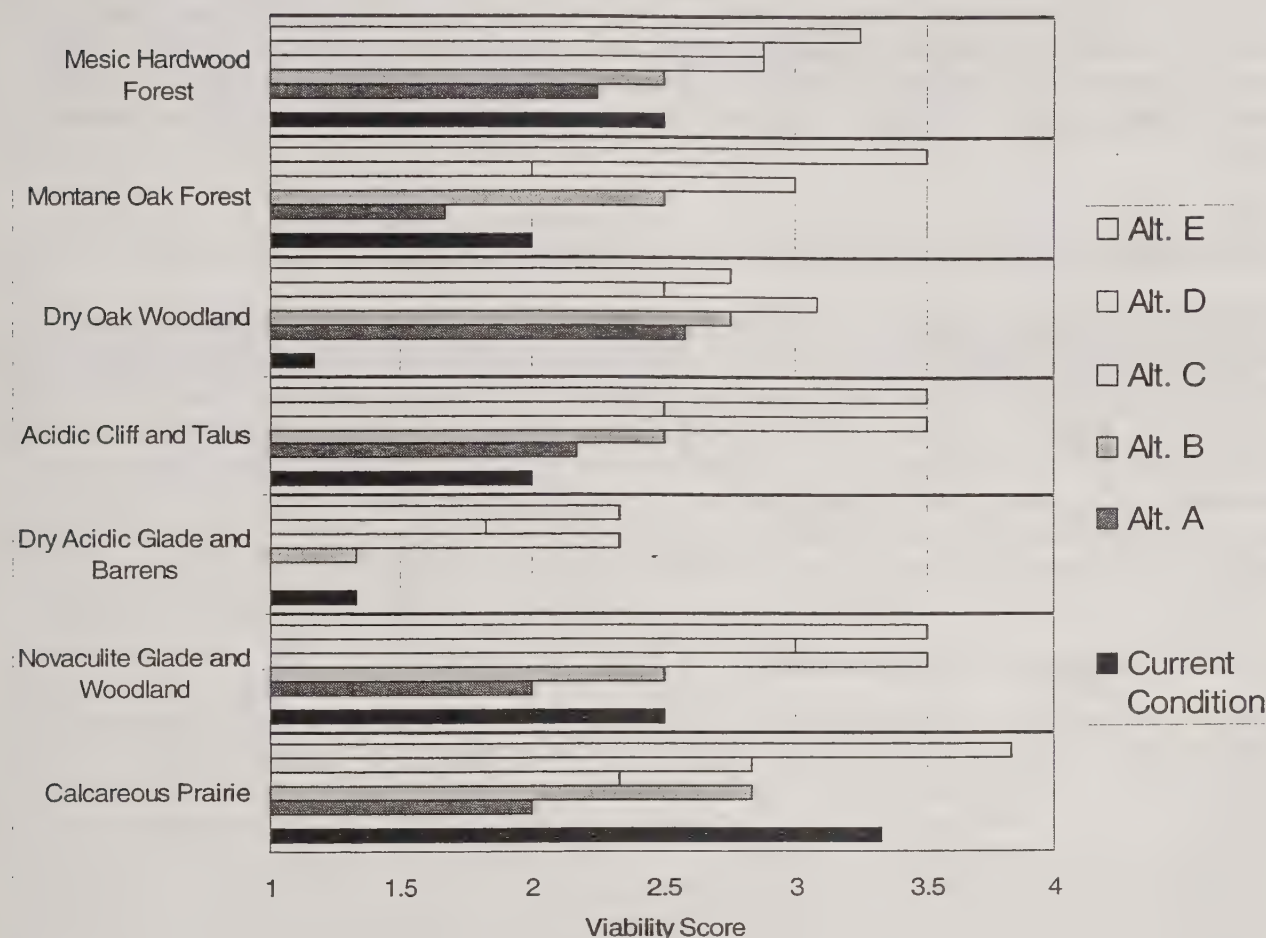


Figure 3.28 Viability Score for Rare Upland Communities by Alternative, 50th Year

Direct and Indirect Effects

As a result of past fire suppression efforts, most rare upland communities have some level of need for restoration of an appropriate fire regime. Some mortality of individual associated plants and animals could occur as a result of restoration, as well as maintenance activities. The benefits to those species by restoring the habitat will far outweigh those few casualties. Short-term negative effects to individual plants and animals are expected to be minimal compared to the long-term positive effects of habitat restoration.

As the Ouachita Mountains encompass a large part of the uplands, and these communities are dispersed and embedded within the uplands, appropriate management of these rare upland communities across the landscape is critical to the sustainability of these habitats.

Alternative A would result in the least benefit to all of the rare upland communities, with the exception of Alternative D, which is least beneficial to the dry oak woodland community. Alternative C would result in the greatest benefit to the dry oak woodland but lower benefits for the calcareous prairie. Alternative E would result in the greatest benefit to the most communities.

Cumulative Effects

Cumulative effects on the areas and distribution of these generally small, embedded habitats are predicted by considering opportunities to inventory and restore these communities across all alternatives. Management to restore, maintain, and protect these communities is limited by inadequate inventories regarding their occurrence and distribution on the landscape, but the action alternatives include provisions to improve these inventories. These communities are classified as unsuitable for timber production and are managed to restore or maintain ecosystem health.

Riparian and Aquatic-Associated Terrestrial Communities

Riparian and aquatic-associated terrestrial ecosystems comprise approximately 14 percent of the Forest, and are managed within designated Streamside Management Areas (SMAs) to protect and maintain water quality, productivity, channel stability, and habitat for riparian-dependent species. The desired condition is that watercourses are in proper functioning condition and support healthy populations of native species. Due to the similarity in the characteristics and the conservation management of these communities, they are grouped together for the analysis of potential management effects. Brief descriptions and desired conditions for individual riparian and aquatic associated terrestrial ecosystems are provided in the following paragraphs.

Ouachita Mountain Forested Seeps

Forested seeps occur throughout the Ouachita Mountains of Arkansas and Oklahoma, along the lower slopes of smaller valleys where rock fractures allow water to seep out of the mountainsides and into the riparian zones of larger creeks, sometimes extending upslope along small ephemeral drainages. The soil remains saturated to moist throughout the year. The vegetation typically is in a forested condition but is highly variable in canopy composition. Red maple, black tupelo, sweetgum, and white oak are common and typical; American beech and/or umbrella magnolia may also be present. Canopy coverage may be moderately dense to quite open. The subcanopy is often well-developed and characteristically includes American holly, umbrella magnolia, and ironwood. Table 3.48 lists the key factors for Ouachita forested seeps current condition.

Table 3.48 Ouachita Forested Seeps Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Remoteness	Road Density in miles/mile ²	>2	1-2	0.5-1	<0.5	4.05	Poor
No-Activity Protection Zone	Areal Extent of Buffer in Feet from seep perimeter	<50	51-99	100	100	100	Very Good
Composite SVE Score is 2.5—Fair							

Overall SVE condition score for forested seeps is 2.50 (Fair). These systems are small, isolated, and/or disjunct and are "embedded" in a larger habitat matrix. The conditions needed to support good/very good conditions in this system are a largely unroaded, undisturbed, mature forested system with a protective buffer of at least 100 feet beyond the seep boundaries. Current road

density within this system is particularly high, and may be partially attributable to the ponding effect that frequently results from road construction.

Canopy closure and vertical structure are primarily naturally occurring, mature forest conditions, with wind storms and/or occasional pest infestations creating small patch openings that allow for a sparse early seral stage component. The fire regime needed to support good/very good conditions is one in which fire is allowed to burn into forested seeps, but no concentrated effort to force them to burn is used.

Forested seeps provide obligate habitat for two species, optimal habitat for five species, and suitable habitat for five species considered in the SVE as shown in the following tabulation:

Species	Importance of Forested Seeps
Four-toed Salamander (<i>Hemidactylium scutatum</i>) Large-leaved Grass-of-Parnassus (<i>Parnassia grandifolia</i>)	Obligate
Ouachita Dusky Salamander (<i>Desmognathus brimleyorum</i>) Rich Mountain Salamander (<i>Plethodon ouachitae</i>) An Isopod (<i>Lirceus bicuspidatus</i>) Southern Lady's-Slipper (<i>Cypripedium kentuckiense</i>) Dryopteris (<i>Dryopteris x australis</i>)	Optimal
Ringed Salamander (<i>Ambystoma annulatum</i>) Mole Salamander (<i>Ambystoma talpoideum</i>) Many-ribbed Salamander (<i>Eurycea multiplicata multiplicata</i>) Sequoiah Slimy Salamander (<i>Plethodon sequoyah</i>) A Corn-Salad (<i>Valerianella palmeri</i>)	Suitable

Ouachita Riparian

This forested system is found along streams and small rivers within the Ouachita Mountains. In contrast to larger floodplains, this system has much less floodplain development and often contains cobble bars and steep banks. Ouachita riparian systems are typically of high gradient and experience periodic, strong flooding. This system is often characterized by cobble bars with directly adjacent forest. Canopy cover can vary, but typical trees include sweetgum, sycamore, river birch, maple species, and oak species. The richness of the herbaceous layer varies from species-rich to species-poor. Likewise, the shrub layer can vary considerably, and small seeps can often be found within this system, especially at the headwaters and terraces of streams. These areas are often dominated by wetland-obligate species of sedges, ferns, and other herbaceous species. Flooding and scouring strongly influence this system and prevent the floodplain development found on larger rivers. Table 3.49 lists the key factors for Ouachita riparian current condition.

Table 3.49 Ouachita Riparian Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	>80	Very Good
Riparian Protection Buffer	Percent of Riparian Buffered	<100	<100	100	100	100	Very Good
Remoteness	Road Density in miles/mile ²	>2	1-2	0.5-1	<0.5	2.57	Poor
Composite SVE Score is 2.67—Good							

The overall SVE condition score for Ouachita Riparian is 2.67 ("Good"). Ouachita riparian systems are linear along the streams and rivers, and embedded throughout the dominant forest type. The defining characteristic of this system is canopy closure greater than 80 percent. Canopy closure is currently very near 100 percent. Protective management buffers are very good, but road density is excessively high.

The condition needed to sustain this system is a largely unroaded, undisturbed, mature forested system with a protective buffer of minimal management on perennial streams, and streams with defined channels. Vertical structure is primarily naturally occurring mature forest condition with wind storms and/or occasional pest infestations creating small patch openings that allow for a sparse early seral stage component.

These systems rely heavily on surrounding and/or adjacent habitats for landscape scale functions and processes such as fire. Vertical structure is primarily naturally occurring mature forest condition with wind storms or occasional pest infestations creating small patch openings that allow for a sparse early seral component. The fire regime needed to support good conditions is one in which fire is allowed to burn into the forested riparian areas, but no concentrated effort to force them to burn is apparent.

Ouachita riparian areas provide optimal habitat for 16 species, suitable habitat for 19 species, and marginal habitat for two species considered in the SVE. In addition, one MIS finds optimal habitat in Ouachita Riparian communities, and two MIS find suitable habitat there. MIS are labeled as such in the following tabulation:

Species	Importance of Ouachita Riparian
Kiamichi Mountain Salamander (<i>Plethodon kiamichi</i>) Rich Mountain Salamander (<i>Plethodon ouachitae</i>) Cerulean Warbler (<i>Dendroica cerulea</i>) Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS Acadian Flycatcher (<i>Empidonax virescens</i>) Worm-eating Warbler (<i>Helmitheros vermivorus</i>) Wood Thrush (<i>Hylocichla mustelina</i>) Kentucky Warbler (<i>Oporornis formosus</i>) Yellow-throated Vireo (<i>Vireo flavifrons</i>) Hooded Warbler (<i>Wilsonia citrina</i>) Ouachita Leadplant (<i>Amorpha ouachitensis</i>) Southern Lady's-Slipper (<i>Cypripedium kentuckiense</i>) Moore's Larkspur (<i>Delphinium newtonianum</i>) Browne's Waterleaf (<i>Hydrophyllum brownei</i>) Ozark Spiderwort (<i>Tradescantia ozarkana</i>) Ozark Least Trillium (<i>Trillium pusillum</i> var <i>ozarkanum</i>) A Corn-Salad (<i>Valerianella palmeri</i>)	Optimal
Ringed Salamander (<i>Ambystoma annulatum</i>) Mole Salamander (<i>Ambystoma talpoideum</i>) Caddo Mountain Salamander (<i>Plethodon caddoensis</i>) Fourche Mountain Salamander (<i>Plethodon fourchensis</i>) Sequoyah Slimy Salamander (<i>Plethodon sequoyah</i>) Southern Redback Salamander (<i>Plethodon serratus</i>) Strecker's Chorus Frog (<i>Pseudacris streckeri streckeri</i>) Chuck-will's-widow (<i>Caprimulgus carolinensis</i>) Chimney Swift (<i>Chaetura pelagica</i>) Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>) Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS Painted Bunting (<i>Passerina ciris</i>) Southeastern Myotis (<i>Myotis austroriparius</i>) Indiana Bat (<i>Myotis sodalis</i>) White-tailed Deer (<i>Odocoileus virginianus</i>) MIS Dryopteris (<i>Dryopteris x australis</i>) Ouachita Bluet (<i>Houstonia ouachitana</i>) Butternut (<i>Juglans cinerea</i>) Timber Rattlesnake (<i>Crotalus horridus</i>)	Suitable
Northern Crawfish Frog (<i>Rana areolata circulosa</i>) Waterfall's Sedge (<i>Carex latebracteata</i>)	Marginal

West Gulf Coastal Plain Small Stream and River Forest

This is a predominately forested system in the West Gulf Coastal Plain (WGCP) that is associated with small rivers and streams. In contrast to WGCP Large River Floodplain Forest, examples of this system have fewer major geomorphic floodplain features. Those features that are present tend to be smaller and more closely intermixed with one another, resulting in less obvious vegetational zonation. Bottomland hardwood species are typically important and diagnostic, although mesic hardwood species also occur in areas with less inundation, such as upper terraces. As a whole, flooding occurs annually, but the water table usually is well below the soil surface throughout most of the growing season. Areas are frequently to occasionally impacted by beaver impoundments. Table 3.50 lists the key factors for West Gulf Coastal Plain small stream and river forest current condition.

Table 3.50 West Gulf Coastal Plain Small Stream and River Forest Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	>80	Very Good
Remoteness	Road density in miles/mile ²	>2	1-2	0.5-1	<0.5	1.12	Fair
Composite SVE Score is 3.00—Good							

The overall SVE condition score for the WGCP small stream and river forests is 3.00 (Good). The WGCP small stream and river forest systems are linear along the streams and small rivers, and embedded throughout the bottomland hardwood forest type. The defining characteristic of this system is canopy closure greater than 80 percent. Canopy closure is currently very near 100 percent. The appropriate conditions needed to sustain this system are a largely mature, closed-canopy forest shaped by intact hydrologic functions and processes with a protective buffer of minimal management on perennial streams and rivers.

These systems rely heavily on surrounding and/or adjacent habitats for landscape scale functions and processes such as fire. Vertical structure is primarily naturally occurring mature forest condition with wind storms or occasional pest infestations creating small patch openings that allow for a sparse early seral component. The fire regime needed to support good conditions is one in which fire is allowed to burn into the small stream and river forest, but no concentrated effort to force them to burn is apparent.

The WGCP small stream and river forest provides optimal habitat for 14 species and suitable habitat for four species considered in the SVE. In addition, one MIS finds optimal habitat in WGCP Small Stream and River Forest communities, and two MIS find suitable habitat there. MIS are labeled as such in the following tabulation:

Species	Importance of West Gulf Coastal Plain
Bird-voiced Tree Frog (<i>Hyla avivoca</i>) Chimney Swift (<i>Chaetura pelagica</i>) Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS Acadian Flycatcher (<i>Empidonax virescens</i>) Bald Eagle (<i>Haliaeetus leucocephalus</i>) Wood Thrush (<i>Hylocichla mustelina</i>) Swainson's Warbler (<i>Limnothlypis swainsonii</i>) Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>) Kentucky Warbler (<i>Oporornis formosus</i>) Painted Bunting (<i>Passerina ciris</i>) Prothonotary Warbler (<i>Protonotaria citrea</i>) Yellow-throated Vireo (<i>Vireo flavifrons</i>) Hooded Warbler (<i>Wilsonia citrina</i>) Mississippi Green Water Snake (<i>Nerodia cyclopion cyclopion</i>)	Optimal

Species	Importance of West Gulf Coastal Plain
Chuck-will's-widow (<i>Caprimulgus carolinensis</i>) Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS White-tailed Deer (<i>Odocoileus virginianus</i>) MIS Timber Rattlesnake (<i>Crotalus horridus</i>)	Suitable

South-Central Interior Large Floodplain

This system occurs along large rivers where topography and alluvial processes have resulted in a well-developed floodplain. A single occurrence may extend from river's edge across the outermost extent of the floodplain or to where it meets a wet meadow or upland system. These systems generally contain well-drained levees, terraces and stabilized bars, and some include herbaceous sloughs and shrub wetlands resulting, in part, from beaver activity. A variety of soil types may be found within the floodplain, from very well-drained sandy substrates to very dense clays. It is this variety of substrates in combination with different flooding regimes that creates the mix of vegetation. Most areas are inundated at some point each spring; microtopography determines how long the various habitats are inundated.

Although vegetation is quite variable in this broadly defined system, silver maple, sycamore, sweetgum, and oak species are common. Understory species are mixed, but include shrubs and sedges. This system likely floods at least once annually and can be altered by occasional severe floods. Impoundments and conversion to agriculture can also impact this system. Table 3.51 lists the key factors for South-Central interior large floodplain current condition.

Table 3.51 South-Central Interior Large Floodplain Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Canopy Closure	Percent of the areal extent with >80% canopy closure	<25	25-50	51-75	>75	>80	Very Good
Remoteness	Road Density in miles/mile ²	>2	1-2	0.5-1	<0.5	0	Very Good
Composite SVE Score is 4.00—Very Good							

The overall SVE condition score for the large floodplain habitat is 4.00 (Very Good). The defining characteristic of this interior large floodplain system is canopy closure greater than 80 percent. Canopy closure is currently very near 90 percent. The appropriate conditions needed to sustain this system are a largely mature, closed-canopy forest shaped by intact hydrologic functions and processes.

This system relies heavily on surrounding and/or adjacent habitats for landscape scale functions and processes such as fire. Vertical structure is primarily naturally occurring mature forest condition with wind storms or occasional pest infestations creating small patch openings that allow for a sparse early seral component. The fire regime needed to support good conditions is one in which fire is allowed to burn into the interior large floodplain, but no concentrated effort to force them to burn is apparent.

The south-central interior large floodplain forest provides optimal habitat for 10 species and suitable habitat for six species considered in the SVE. In addition, one MIS finds optimal habitat in South-Central Interior Large Floodplain, and three MIS find suitable habitat there. MIS are labeled as such in the following tabulation:

Species	Importance of South Central Interior Large Floodplain
Chimney Swift (<i>Chaetura pelagica</i>) Cerulean Warbler (<i>Dendroica cerulea</i>) Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS Acadian Flycatcher (<i>Empidonax virescens</i>) Bald Eagle (<i>Haliaeetus leucocephalus</i>) Wood Thrush (<i>Hylocichla mustelina</i>) Swainson's Warbler (<i>Limnothlypis swainsonii</i>) Painted Bunting (<i>Passerina ciris</i>) Prothonotary Warbler (<i>Protonotaria citrea</i>) Yellow-throated Vireo (<i>Vireo flavifrons</i>) Hooded Warbler (<i>Wilsonia citrina</i>)	Optimal
Chuck-will's-widow (<i>Caprimulgus carolinensis</i>) Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>) Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS Scarlet Tanager (<i>Piranga olivacea</i>) MIS Southeastern Myotis (<i>Myotis austroriparius</i>) White-tailed Deer (<i>Odocoileus virginianus</i>) MIS	Suitable

West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough Wildlife Management Area-WMA)

This unique wetland resource known today as the Red Slough Wildlife Management Area (WMA) was formerly one of the largest wetland complexes found in Oklahoma. Most of this area was lost or drastically altered by conversion to agricultural lands over the course of the last century. Historically, bottomland hardwoods dominated the area, accounting for 75 percent of the Red Slough area. Scrub/shrub, aquatic emergent vegetation, and prairie habitats accounted for the remaining 25 percent.

The Red Slough WMA is currently a 5,974-acre wetland project designed to restore hydrology and reestablish bottomland hardwoods. It is cooperatively managed by the USDA Forest Service, USDA Natural Resources Conservation Service, and Oklahoma Department of Wildlife Conservation to maintain the annually flooded marsh condition, with some reestablishment of a bottomland-hardwood dominated forest shaped by restored hydrological functions and processes. The current primary objective for this area is to provide recreation opportunities, particularly watchable wildlife and waterfowl hunting, while maximizing native biodiversity potential.

The Red Slough WMA consists of approximately 3,700 acres of moist soil management units, 1,875 acres of bottomland hardwood reforestation fields, and 397 acres of reservoirs. Habitat types consist of mudflats, emergent marshes, shallow water impoundments, deep-water reservoirs, riparian zones, bottomland hardwoods, wet prairies, and scrub/shrub. Table 3.52 lists the key factors for West Gulf Coastal Plain wet hardwood flatwoods (Red Slough Area) current condition.

Table 3.52 West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough Area) Condition

Key Factor	Indicator Name	Poor	Fair	Good	Very Good	Current Value	Current Rating
Fire Frequency	Percent burned every 25-35 years	<25	25-50	51-75	>75	65	Good
Fire Seasonality	Percent of burns in growing season (March- Sept.)	<25	25-50	51-75	>75	55	Good
Remoteness	Road Density in miles/mile	>2	1-2	0.5-1	<0.5	0.69	Good
Composite SVE Score is 3.00—Good							

The overall SVE condition score for the WGCP wet hardwood flatwoods is 3.00 ("Good"). Forest-wide direction for desired road density (miles/square mile) within the Red Slough WMA is less than one mile per square mile. The current road density is approximately 0.7 miles per square mile. The fire regime should reflect that at least 50 percent of the Red Slough WMA is prescribed burned within every 25-35 years with an occasional growing season burn included. The most recent fire history indicates that this is occurring.

The Red Slough provides optimal habitat for nine species and suitable habitat for seven species considered in the SVE; of these, one species for which Red Slough provides optimal conditions is also an MIS. One additional MIS finds marginal habitat here. In the following tabulation, the MIS are labeled; MIS that were evaluated as part of the SVE are labeled "SVE/MIS."

Species	Importance of Red Slough WMA
Prairie Warbler (<i>Dendroica discolor</i>) SVE/MIS Acadian Flycatcher (<i>Empidonax virescens</i>) Wood Thrush (<i>Hylocichla mustelina</i>) Swainson's Warbler (<i>Limnothlypis swainsonii</i>) Kentucky Warbler (<i>Oporornis formosus</i>) Painted Bunting (<i>Passerina ciris</i>) Prothonotary Warbler (<i>Protonotaria citrea</i>) Yellow-throated Vireo (<i>Vireo flavifrons</i>) White-eyed Vireo (<i>Vireo griseus</i>)	Optimal
Chuck-will's-widow (<i>Caprimulgus carolinensis</i>) Chimney Swift (<i>Chaetura pelagica</i>) American Kestrel (<i>Falco sparverius</i>) Bald Eagle (<i>Haliaeetus leucocephalus</i>) Orchard Oriole (<i>Icterus spurius</i>) Hooded Warbler (<i>Wilsonia citrina</i>) Timber Rattlesnake (<i>Crotalus horridus</i>)	Suitable
Eastern Wild Turkey (<i>Meleagris gallopavo</i>) MIS	Marginal

Direct and Indirect Effects

The riparian and aquatic-associated communities comprise approximately 14 percent of the total Forest area, and due to the fairly similar application in all alternatives of the Streamside Management Area (SMA) protection designation, they are grouped together for the analysis of potential management effects. Under all alternatives, these communities are managed under SMA standards that define these riparian corridors (minimum of 100 feet on both sides of perennial streams and minimum of 30 feet on either side of other defined stream channels). These communities are classified as unsuitable for timber production and are managed for improved or maintained health.

The management goal for riparian vegetation systems is to maintain or enhance the structural and functional integrity of the riparian areas and those associated aquatic and upland systems. Riparian corridor characteristics important to the structural and functional integrity for terrestrial species include habitat connectivity (travel corridors); vegetation diversity (including age, species composition, canopy closure, and vertical structure), abundance of snags and woody debris, and a protection buffer width that is adequate to retain riparian habitat functions.

Riparian corridors or SMAs also function as protection and management towards water quality and important stream functions, as well as bridging the functional aspects with the upland communities. Therefore, they present an opportunity to manage riparian habitat as a comprehensive system in which streams or rivers and upland communities mutually influence each other. Figures 3.29 and 3.30 present viability scores for riparian communities by alternative at the 10th year and 50th year, respectively.

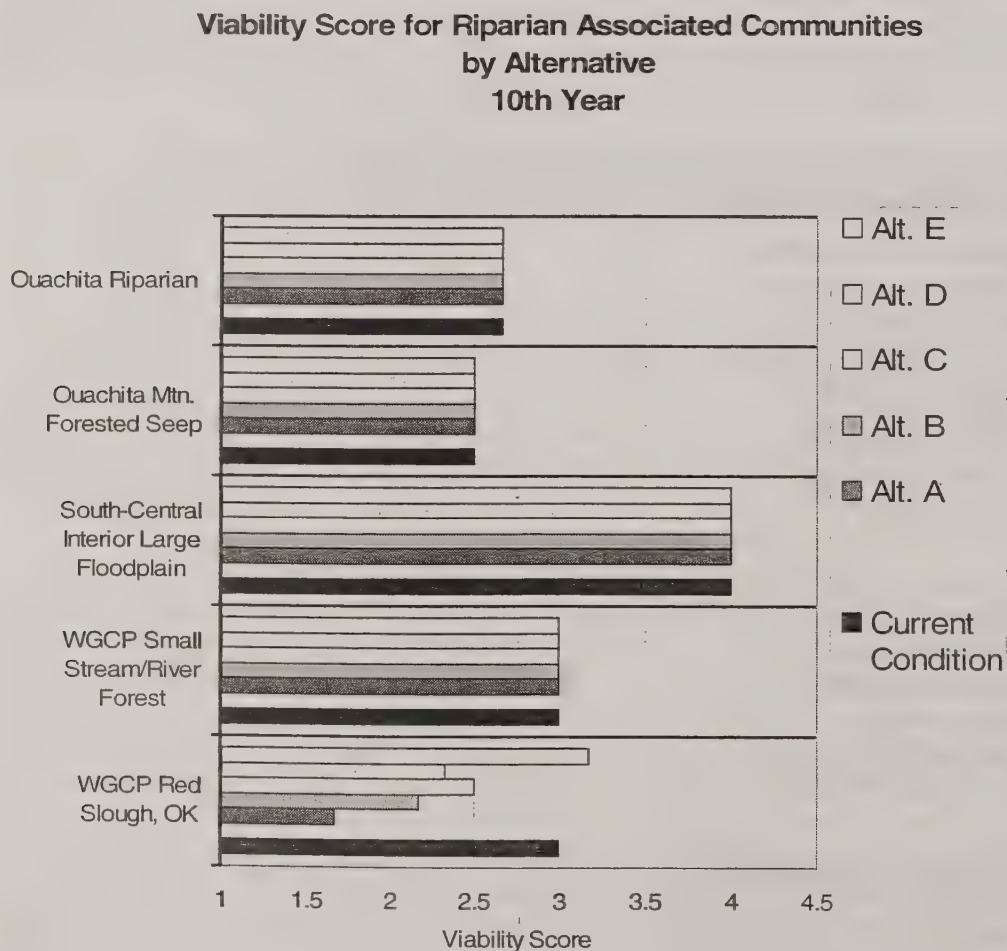


Figure 3.29 Viability Score for Riparian Associated Communities by Alternative, 10th Year

Viability Score for Riparian Associated Communities by Alternative 50th Year

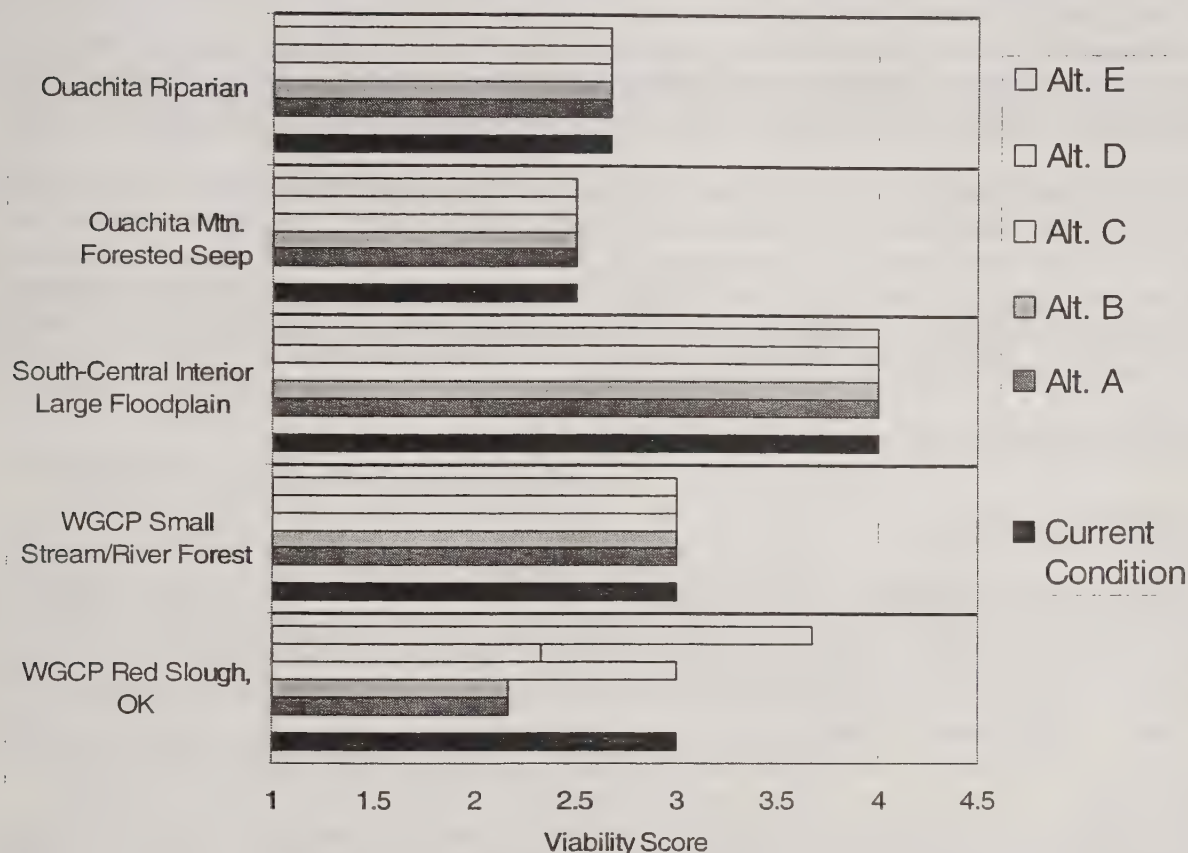


Figure 3.30 Viability Score for Riparian Associated Communities by Alternative, 50th Year

Activities not permitted in SMAs under any alternative would include mechanical site preparation or ripping; log loading areas; livestock feeding or distribution areas or convenience structures (salting and dusting facilities, corrals, etc.); or wheeled or crawler vehicles except at designated crossings or for wildfire suppression, stream habitat enhancement, and prescribed burning. Activities permitted in SMAs under all alternatives would include felling of individual trees for safety; prescribed fire; construction and maintenance of non-motorized trails; trails for OHVs; boat and fishing docks, launching ramps/areas and swimming beaches; road construction, reconstruction, and maintenance; and temporary roads and skid trails to designated crossings.

The following activities would not be permitted within SMAs under Alternatives A and B, but would be permitted under certain circumstances within Alternatives C, D, and E: felling of individual trees and brush removal to enhance visual quality; use of aquatic approved pesticides for treatment of invasive non-native and nuisance species; felling of individual trees or creating snags for habitat enhancement for riparian-dependent or PETS species (habitat enhancement for Red-cockaded Woodpeckers would still be permitted within SMAs under Alternatives A and B); control of Southern Pine and/or Ips Beetle infestations and cable skidding within primary buffers if necessary for infestation control; thinning in offsite loblolly pine plantations to reduce vulnerability to Southern

Pine and/or Ips Beetle and/or restore native vegetation; and thinning to reduce vulnerability to insect and diseases and/or restore native vegetation.

Cumulative Effects

Cumulatively, implementation of the current SMA standards under Alternatives A and B is expected to continue to increase the proportion of late successional forest towards old growth conditions within these riparian associated communities. The abundance of snags, den trees and downed wood would continue, providing important habitat for many riparian-dependent species. This management regime also results in abundant and well-distributed habitats characterized by closed canopy or shaded, low-disturbance, moist-soil micro-habitats that are preferred by a large number of riparian associated plant and animal species.

Cumulatively, implementation of the SMA standards under Alternatives C, D, and E would provide most all of the previously stated benefits of Alternatives A and B. Alternatives C and E may also provide an increase in sedimentation entering the waterways from construction of firelines, as well as disturbances from entering the SMAs for pest and non-native invasive species infestations. Access to the SMAs to treat for pests, diseases, and off-site and non-native invasive species should cumulatively contribute to the conservation of healthy and native SMA vegetation.

Special Terrestrial Habitats and Habitat Elements

Cave and Mine Habitat

This habitat element encompasses subterranean habitat types within the influence of National Forest management activities. Caves refer to naturally occurring underground cavities, chambers, or series of chambers, especially ones with an opening in the side of a hill or mountain. A crevice cave in Oklahoma is the only known cave within the Ouachita National Forest. Mines refer to man-made underground cavities, chambers, or series of chambers, especially ones with an opening in the side of a hill or mountain. All known caves and mines that are susceptible to wildlife use and/or habitat disturbances. They are gated for the protection and conservation of the habitat and associated species, as well as public safety. Cave and mine habitat provides obligate habitat for three species considered in the SVE as listed in the following tabulation:

Species	Importance of Caves/Mines
Southeastern Myotis (<i>Myotis austroriparius</i>) Eastern Small-Footed Bat (<i>Myotis leibii</i>) Indiana Bat (<i>Myotis sodalis</i>)	Obligate

Direct, Indirect, and Cumulative Effects

Under all alternatives, cave and mine habitat is gated for human safety with-bat friendly gates that allow passage for bat roosting habitat, as well as passage for other small animals that utilize this habitat. Cave and mine habitat would continue to be protected by maintaining gates to prevent species and habitat disturbance. The direct, indirect, and cumulative effects to cave and mine habitat under all alternatives would protect and maintain the integrity of the subterranean habitat.

Large Trees Near Water

Current direction provides for the conservation of SMAs as unsuitable for timber management. Large trees near water have therefore been retained within the riparian and floodplain areas forest-wide with the exception of removing hazard trees for safety.

Large trees near water provide obligate habitat for one species and optimal habitat for five species considered in the SVE, plus optimal habitat for one MIS, as listed in the following tabulation:

Species	Importance of Large Trees Near Water
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Obligate
Cerulean Warbler (<i>Dendroica cerulea</i>) Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS Southeastern Myotis (<i>Myotis austroriparius</i>) Eastern Small-Footed Bat (<i>Myotis leibii</i>) Indiana Bat (<i>Myotis sodalis</i>)	Optimal

Direct, Indirect, and Cumulative Effects

Under all alternatives, large trees near water are maintained within Streamside Management Areas (SMAs) for the duration of their natural lifespan unless there is a safety risk, off-site loblolly is present, or a southern pine beetle or Ips beetle infestation occurs. The direct, indirect and cumulative effects to the “large trees near water” habitat under all alternatives would protect, maintain, and/or enhance the integrity of the primarily SMA structural habitat.

Snags, Cavity/Den Trees, Down Logs/Woody Debris

Snags, cavity (den) trees, and down woody debris on the forest floor are important natural, structural habitat components. The dependency of cavity-nesting wildlife species on an adequate and continuous supply of snags and cavity trees is well documented. Primary excavators (e.g., most woodpeckers) require snags of certain size and hardness to create nesting and roosting cavities. Secondary cavity-nesting species are in turn dependent on the cavities created by the primary excavators. Most cavity-nesting birds are insectivorous and play an important role in forest ecology and in the control of insect pests.

Cavity tree structure needs can usually be met in filter strips, key areas, wildlife inclusions, or in adjacent lands not suited for timber production. The objective is to provide for den trees and clumps of den trees well distributed over the Forest to ensure their availability for dependent cavity dwelling species.

Some 38 species of Arkansas and Oklahoma birds excavate nesting holes, use cavities resulting from decay, or use holes created by other species in dead or deteriorating trees. Fifty-eight species of amphibians, reptiles, and mammals are known to use snags or the resulting dead and down material. Snags also provide perches for birds of prey and foraging substrate for a wide variety of wildlife.

The 1990 Forest Plan provided for conservation of snag and den trees in that all snags and den trees were retained during timber harvesting, site preparation, and wildlife habitat improvements. In areas where less than two snags per acre of 16 inches diameter at breast height occurred and fire

is unlikely to create more, snags should be developed by girdling trees of sufficient size and density.

Snag structure provides obligate habitat for five species and optimal habitat for two species considered in the SVE; snags also provide optimal habitat for one MIS, as shown in the following tabulation:

Species	Importance of Snags
American Kestrel (<i>Falco sparverius</i>) Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>) Prothonotary Warbler (<i>Protonotaria citrea</i>) Brown-headed Nuthatch (<i>Sitta pusilla</i>) Indiana Bat (<i>Myotis sodalis</i>)	Obligate
Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS Southeastern Myotis (<i>Myotis austroriparius</i>)	Optimal

Large and small diameter den trees provide obligate habitat for two and optimal habitat for four species considered in the SVE; this habitat element also provides optimal habitat for one MIS, as shown in the following tabulation:

Species	Importance of Den Trees
Chimney Swift (<i>Chaetura pelagica</i>) Prothonotary Warbler (<i>Protonotaria citrea</i>)	Obligate
Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>) Southeastern Myotis (<i>Myotis austroriparius</i>) Indiana Bat (<i>Myotis sodalis</i>)	Optimal

Riparian associated communities and the rare upland communities (mesic hardwoods, in particular) provide down woody debris in areas close to water and in the water, as well as in the drier upland areas. At least 58 species of amphibians, reptiles, and mammals on the Forest are known to use snags or the resulting dead and down material as snags decay and fall to the forest floor. Many salamander species and the Ouachita slitmouth snail use logs and down woody debris for cover as well as forage. Several bird species as well as mammals such as skunks, mice, and black bear utilize this structure, particularly for foraging.

All alternatives provide for downed logs and woody debris, and require the following, "Where available, retain or develop 50 linear feet of pine logs (12 inch or greater diameter) and 50 linear feet of hardwood logs (12 inch diameter or greater) per acre as wood debris on the forest floor within harvest areas. Felled logs will be oriented along contours."

Downed logs and woody debris on the forest floor provide optimal habitat for 17 species and suitable habitat for four species considered in the SVE; one MIS finds optimal foraging habitat in downed woody debris, as shown in the following tabulation:

Species	Importance of Down Woody Material
Kiamichi Mountain Salamander (<i>Plethodon kiamichi</i>) Rich Mountain Salamander (<i>Plethodon ouachitae</i>) Ringed Salamander (<i>Ambystoma annulatum</i>) Mole Salamander (<i>Ambystoma talpoideum</i>) Caddo Mountain Salamander (<i>Plethodon caddoensis</i>) Fourche Mountain Salamander (<i>Plethodon fourchensis</i>) Sequoyah Slimy Salamander (<i>Plethodon sequoyah</i>) Southern Redback Salamander (<i>Plethodon serratus</i>) Four-toed Salamander (<i>Hemidactylium scutatum</i>) Ouachita Dusky Salamander (<i>Desmognathus brimleyorum</i>) Many-ribbed Salamander (<i>Eurycea multiplicata multiplicata</i>) Rich Mountain Slitmouth Snail (<i>Stenotrema pilsbryi</i>) Ouachita Slitmouth Snail (<i>Stenotrema unciferum</i>) Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>) Pileated Woodpecker (<i>Dryocopus pileatus</i>) MIS Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>) Timber Rattlesnake (<i>Crotalus horridus</i>)	Optimal
Bewick's Wren (<i>Thyromanes bewickii</i>) Southern Prairie Skink (<i>Eumeces septentrionalis obtusirostris</i>) Western Diamondback Rattlesnake (<i>Crotalus atrox</i>) Great Plains Skink (<i>Eumeces obsoletus</i>)	Suitable

Direct, Indirect, and Cumulative Effects

Under all alternatives, snags, cavity (den) trees, and down woody debris on the forest floor are created, protected, maintained, or enhanced, particularly within Streamside Management Areas (SMAs) and Rare Upland Communities for the duration of their natural lifespan unless there is a human safety or forest health (disease or pest) risk. The direct, indirect and cumulative effects to “snags, cavity (den) trees, and down woody debris on the forest floor” habitat under all alternatives would create, protect, maintain and/or enhance these important forest habitat components.

Mast Production

Although no mast-dependent species of viability concern were identified during the SVE, hard mast (acorns and hickory nuts) is an important habitat element for several wildlife species in demand for sport hunting, including white-tailed deer, eastern wild turkey, squirrel, and black bear. Mid to late-successional oak, hickory, and pine-hardwood forests provide an important source of hard mast on the Forest. The availability of acorns has been demonstrated to strongly influence population dynamics of demand species and non-game animals such as white-footed mice.

Annual hard mast production on the Forest is highly variable, with production levels varying as much as 33 percent within the same areas in consecutive years. Published studies have shown variability in acorn production from tree to tree, species to species, and year to year; they also show that abundant acorn crops are generally produced at intervals shorter than five years. Rarely is there a complete failure. Although small in quantity at times, some mast is usually produced every year. Many factors influence the size of an acorn crop and its availability for wildlife. Each tree has certain inherent capabilities for acorn production, and the extent to which these capabilities are realized is likely the result of environmental influences, such as competition, nutrient reserve, rainfall, and late frosts.

The importance of a variety of oak species within pine and hardwood stands cannot be overemphasized, because no single species of oak can be relied upon to produce acorns year after

year. Diversity of oak species composition lends itself to greater consistency of production, which may be the most important factor relating to wildlife. Wildlife utilization of alternative food sources in years of poor mast crops is well documented. Although available literature concerning hickory nut production on the Ouachita suggests only poor to fair production levels, the hickory nut's contribution to overall abundance and diversity of available hard mast should not be minimized.

Of the forest vertebrates requiring the structure of mature hardwood and hardwood/pine types, the needs of the pileated woodpecker, a management indicator species (MIS), are perhaps the most exacting. Where habitat requirements for this species are provided, conditions will be suitable for those associated species occurring in these habitats. Where habitat adequate to meet the needs of the pileated woodpecker is met, the hardwood structure habitat needs of associated mast-dependent species are assumed to be sufficiently provided.

All alternatives provide for retention or development of the hardwood and hardwood-pine forest types, age 50 and older that are mast producers. Management direction would be for approximately 20 percent of each project area to be designated for mast producing species. Other direction common to all alternatives includes the following:

- Retain clumps of deciduous trees at a rate of one ½-acre clump per 20 acres of regeneration cutting by even aged methods to create den trees. Where possible, locate clumps around existing den trees. In addition, existing den trees will not be felled unless necessary for insect or disease control, or to provide for public and employee safety.
- Retain or develop mature growth pine habitats (80 years old or greater) and mature growth hardwood habitats (100 years old or greater) within each project area at a rate of five percent each.
- Retain or develop a 10-30% hardwood component within managed pine stands.

Current condition score for mast production on the Ouachita National Forest is 2.38 ("Fair"). The mast production SVE score is a composite average of the scores of all communities with mast producing capability including:

- Ouachita Dry Oak Woodland
- Ouachita Dry-Mesic Oak Forest
- Ouachita Mesic Hardwood Forest
- Ouachita Montane Oak Forest
- Ouachita Mountain Forested Seep
- Ouachita Novaculite Glade and Woodland
- Ouachita Pine/Bluestem Woodland
- Ouachita Pine-Oak Forest
- Ouachita Pine-Oak Woodland
- Ouachita Riparian
- South-Central Interior Large Floodplain
- West Gulf Coastal Plain Pine-Hardwood Forest (Flatwoods)
- West Gulf Coastal Plain Small Stream/River Forest

Direct, Indirect and Cumulative Effects

Mast production capability will be managed consistently across all alternatives; current condition would be enhanced across all alternatives. Table 3.53 compares composite mean SVE scores for mast producing capability by alternative.

Table 3.53 Composite Mean SVE Score of Communities with Mast Producing Capability by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Baseline	2.38 Fair	2.38 Fair	2.38 Fair	2.38 Fair	2.38 Fair
10 Year	2.44 Fair	2.73 Good	2.99 Good	2.69 Good	3.07 Good
50 Year	2.49 Fair	2.70 Good	3.05 Good	2.71 Good	3.18 Good

Alternatives B, C, D, and E provide slightly-to-considerably improved conditions for increasing mast production, as reflected in the mean community SVE scores in the preceding table. Alternatives B and D concentrate vegetation management activities within pine-dominated communities and provide the least emphasis on the rare upland hardwood-dominated communities. Alternatives C and E emphasize management activities that meet the needs of all communities for healthy forest conditions, including the mast producing hardwood-dominated communities. Cumulatively, mast production capability would remain consistent or improve slightly-to-considerably in Alternatives C and E, as community health restoration efforts in the dry-mesic hardwoods and rare upland communities are implemented.

Old Growth Habitat

Although many plants and animals thrive in mature forests, there are no plant or animal species in the planning area known to require true old growth conditions (stands of trees at least a century in age, with downed logs and standing snags and an intact natural disturbance regime or comparable managed disturbance regime); that is, there are no “old growth obligate species” on the Ouachita National Forest. Some species, including the pileated woodpecker, would thrive under old growth conditions; however, they also find optimal habitat in younger forest stages that have abundant snags and down woody material. Therefore, the amount and distribution of old growth communities should not be a limiting factor for any species of viability concern on the Forest.

Old growth conditions are of interest and importance primarily because so little old growth remains within the planning area. In 1915, Wilbur Mattoon could observe that “[m]ature shortleaf [pine] occurs over a large region centering in western Arkansas and northern Louisiana. This is the last extensive region of virgin shortleaf forest left” (Mattoon 1915). Mattoon also provided tables showing shortleaf pine density in stands that ranged up to 200 years of age for Arkansas stands that were at various “stocking” levels and maximum, minimum, and average diameter at breast height for stands in western Arkansas that ranged up to 200 years of age. By the mid-1940s (Smith 1986), very little of anything resembling virgin or old growth forest dominated by shortleaf pine remained.

Most stands of old growth oak and other hardwoods were soon cut, too. Some forms of old growth oak forests and woodlands, including the relatively well known stunted oak forests of Rich Mountain, Black Fork Mountain, and other “high” ridges persisted at higher elevations. These mostly stunted forests and woodlands were and remain of little economic importance and therefore were little disturbed by the saw.

Planning for restoration and maintenance of old growth makes it more likely that this ecological gap will be filled in future decades, and that the natural communities that make up the Ouachita National Forest will be represented by a full range of ecological conditions. Disturbances, such as periodic fires, blow downs, ice storms and insect outbreaks, play key roles in natural old-growth forests and woodlands; in ecosystems where fire has been suppressed for decades, reintroduction of a prescribed fire regime may be necessary to restore some of the ecological conditions that once typified old growth in the Ouachita Mountains and Arkansas Valley.

The 1990 Forest Plan (No Action Alternative) addresses old growth in two ways: active management to restore fire-maintained (primarily pine-dominated) old growth forests and woodlands (MA 21) and essentially custodial management to allow natural restoration of old growth conditions (both hardwood-dominated and pine-dominated community types) in research natural areas (MA 4), riparian areas (MA 9), wilderness (MA 1), portions of semi-primitive areas (MA 17), and other parts of the National Forest outside the primary block of "lands suitable for timber production" (MA 14 in the 1990 Forest Plan). The action alternatives maintain this dual approach to old growth management and restoration (active management and custodial management) and differ primarily in terms of the degree of thinning and prescribed burning projected to take place in portions of the dry-mesic oak community.

Seven of the old growth types listed in the white paper prepared by Gaines and others (1997) for the Southern Region of the Forest Service occur on the Forest (Table 3.54). Pine and pine-oak forests and woodlands cover 69 percent of the area, and dry to dry-mesic oak forest and woodland cover nearly 21 percent.

Table 3.54 Existing Forest Cover for Seven Potential Old-Growth Cover Types

Cover type	Percent
Mixed and western mesophytic	0.13
River flood plain hardwood	0.30
Dry-mesic oak	20.60
Dry and xeric oak	0.69
Dry to xeric pine and pine-oak	69.34
Dry and dry-mesic oak-pine	8.43
Seasonally wet oak-hardwood	0.52
Total (rounded)	100.00

Source: USDA Forest Service, Southern Research Station (1999a)

Direct, Indirect, and Cumulative Effects

Under all alternatives, occurrences of the mixed and western mesophytic forest type (Ouachita Mesic Hardwood Forest) on the Ouachita National Forest would be managed to allow old growth conditions to develop (and regenerate naturally). Early to mid-seral conditions in this community are created primarily by natural disturbances. Most, if not all, occurrences of this type are represented by relatively small patches (less than 100 acres)—reflecting their "relict" status in the Ouachita Mountains and the limited distribution of moist coves and other suitable, relatively rare habitats—and the emphasis in all alternatives is on maintaining these patches, not trying to create larger ones artificially.

Similarly, occurrences of river floodplain hardwood (South Central Interior Large Floodplain, Ouachita Riparian) and seasonally wet oak-hardwood (West Gulf Coastal Plain Small Stream and River Forest, West Gulf Coastal Plain Wet Hardwood Flatwoods) would be managed under all alternatives within MA 9 to perpetuate natural vegetation cover and be allowed to age or regenerate naturally. However, the nature of natural disturbance regimes in these systems tends to inhibit the development of centuries-old forests, and patch size is naturally constrained by their linear occurrence in the landscape, regardless of alternative.

Dry-mesic oak forests and woodlands (Ouachita Dry-Mesic Oak Forest and Ouachita Montane Oak Forest) occur in a wide variety of patch sizes across the Forest, and most would be managed under

all alternatives in ways that allow the development of or actively restore old growth conditions in a significant proportion of these patches. Occurrences in wilderness, botanical areas, wild and scenic corridors, research natural areas, special interest areas, and riparian areas would, for the most part, be under custodial management under all alternatives (the minor exceptions may include thinning to control occasional southern pine outbreaks in riparian areas and prescribed burning in some special interest areas to maintain or restore more open conditions). Elsewhere on the Forest, occurrences of dry-mesic oak forests and woodlands would likely be subject to at least occasional prescribed burns under all alternatives. In Alternative C, many of these patches would also be thinned and burned to restore reference conditions (more open, frequently burned stands with episodic oak reproduction); fire would be more frequent. Lesser amounts of thinning and prescribed burning would also take place in these communities than in Alternative E.

A small amount of regeneration (group selection and/or irregular shelterwood or seedtree management), 200 acres per year or less, is projected to take place in dry-mesic oak forest or woodland communities in Alternative E (on suitable lands), and a somewhat greater amount (1,000 acres or less per year) is projected to take place in Alternative C. None of the other alternatives include projected acres of regeneration cutting in this community. Regenerating one-tenth (Alternative E) to five-tenths (Alternative C) of one percent per year of a natural community type that covers approximately 200,000 acres would have very little effect on future old growth dry-mesic oak forest and woodland. In all alternatives, the vast majority of occurrences of dry-mesic oak forest and woodland—which are well distributed across the Forest and exist in the full range of patch sizes—would be managed to allow old growth conditions to develop (and regenerate naturally).

Dry and xeric oak woodlands (Ouachita Dry Oak Woodland) are mostly high elevation communities maintained by edaphic conditions and periodic fire. Occurring naturally in relatively small patches, this community would be managed under all alternatives to perpetuate natural vegetation cover and would be allowed to age or regenerate naturally. Some patches may be thinned to restore historically lower tree densities.

The dry to xeric pine and pine-oak forests and woodlands (Ouachita Shortleaf Pine-Oak Forest and Woodland) that occupy much of the Ouachita National Forest are represented by a broad range of patch sizes. Currently, and in all action alternatives, approximately 79,000 acres of the Forest would be managed with an emphasis on restoration of fire-maintained pine-grass and pine-oak-grass old growth conditions. Thirty-five separate units of between 600 and nearly 6,000 acres (all assigned to MA 21, Pine-Old Growth Restoration), well distributed across the Forest, are managed for such conditions. Although each unit also has hardwood stands, in the aggregate, the units provide for “medium” (100 to 2,499 acres) and “large” (2,500 acres or more) patches of this cover type in all alternatives. In addition, all alternatives include provisions for restoring and maintaining elements of older (100 to 120 year-old), thinned and fire maintained pine-grass patches in MA 22 (Shortleaf Pine-Bluestem-Red-cockaded Woodpecker), which encompasses more than 205,000 acres, 70 percent of which is Ouachita Shortleaf Pine-Oak Forest and Woodland. Conservatively, at least 24,000 acres would consist of patches 100 to 120 years of age at any given time, once the management area reaches the desired condition. Other small to medium patches of this cover type are represented in the scenic areas Blowout Mountain (526 acres), Dutch Creek (624 acres), and Crystal Mountain (100 acres), each of which has “old growth” as part of its desired condition.

Many small, medium, and large patches of Ouachita Shortleaf Pine-Oak Forest and Woodland are under custodial management in Research Natural Areas (MA 4), Riparian Areas (MA 9), Wilderness (MA 1), and portions of Semi-Primitive Areas (MA 17). This circumstance would not change under any alternative. Summaries of the working inventory of “possible old growth” (stands of various community/system types meeting minimum age criteria) and minimum areas within the Forest in which restoration of old growth characteristics would be featured under all alternatives are provided in Appendix D of the 2005 Revised Forest Plan.

Under Alternatives B-E, all of the relatively small patches of Ouachita Mountain Forested Seep would be managed to perpetuate natural vegetation cover and be allowed to age naturally. Old growth conditions are likely to develop in many of these communities.

Terrestrial Endangered, Threatened, Other Species of Viability Concern and Management Indicator Species (MIS)

The comprehensive list of "species of viability concern" for the Forest was compiled from all species that may occur or are known to occur on the Ouachita National Forest from current lists of Proposed, Endangered, Threatened, or Sensitive species for Region 8. Other species of viability concern were identified on the basis of Partners in Flight data, Birds of Conservation Concern identified by the US Fish and Wildlife Service, local expert opinions, and all known endemic and/or locally rare species. Table 3.55 lists the terrestrial plant and animal species considered in the Species Viability Evaluation for the Ouachita National Forest, including Forest, state and global rankings.

Table 3.55 Ouachita National Forest Terrestrial Plant and Animal Species Considered in the Species Viability Evaluation (RF: Sensitive-Regional Forester's Sensitive Species List; BCC: Bird of Conservation Concern; MIS: Management Indicator Species; D: Demand; E: Endemic)

Common Name (<i>Scientific Name</i>)	Viability Concern	BCC	MIS	D	E	State Rank (AR/OK)	Global Rank
Amphibians							
Southern Redback Salamander (<i>Plethodon serratus</i>)	Local viability concern	No	No	No	No	S4/-	G5
Northern Crawfish Frog (<i>Rana areolata circulosa</i>)	Local viability concern	No	No	No	No	S3/-	G4T4
Rich Mountain Salamander (<i>Plethodon ouachitae</i>)	RF Sensitive	No	No	No	Yes	S2/S2	G2G3
Sequoyah Slimy Salamander (<i>Plethodon sequoyah</i>)	RF Sensitive	No	No	No	Yes	-/S2	G2Q
Kiamichi Mountain Salamander (<i>Plethodon kiamichi</i>)	RF Sensitive	No	No	No	Yes	-/S2	G2Q
Fourche Mountain Salamander (<i>Plethodon fourchensis</i>)	RF Sensitive	No	No	No	Yes	S2/-	G2Q
Caddo Mountain Salamander (<i>Plethodon caddoensis</i>)	RF Sensitive	No	No	No	Yes	S2/-	G2
Bird-voiced Tree Frog (<i>Hyla avivoca</i>)	Local viability concern	No	No	No	No	S2/-	G5
Four-toed Salamander (<i>Hemidactylium scutatum</i>)	Local viability concern	No	No	No	No	S2/-	G5

Common Name (Scientific Name)	Viability Concern	BCC	MIS	D	E	State Rank (AR/OK)	Global Rank
Many-ribbed Salamander (<i>Eurycea multiplicata multiplicata</i>)	Local viability concern	No	No	No	Yes	S4/-	G4T4
Ouachita Dusky Salamander (<i>Desmognathus brimeylosum</i>)	RF Sensitive	No	No	No	Yes	S4/S3	G3/G4
Mole Salamander (<i>Ambystoma talpoideum</i>)	Local viability concern	No	No	No	No	S3/-	G5
Ringed Salamander (<i>Ambystoma annulatum</i>)	Local viability concern	No	No	No	No	S4/-	G4
Strecker's Chorus Frog (<i>Pseudacris streckeri streckeri</i>)	Local viability concern	No	No	No	No	S2/-	G5T5
Bird							
Wood Thrush (<i>Hylocichla mustelina</i>)	Local viability concern	Yes	No	No	No	-/-	G5
Bewick's Wren (<i>Thyomanes bewickii</i>)	Local viability concern	Yes	No	No	No	S2/S4	G5
Brown-headed Nuthatch (<i>Sitta pusilla</i>)	Local viability concern	Yes	No	No	No	S4/-	G5
Yellow-throated Vireo (<i>Vireo flavifrons</i>)	Local viability concern	Yes	No	No	No	-/-	G5
Prairie Warbler (<i>Dendroica discolor</i>)	Local viability concern	Yes	Yes	No	No	-/-	G5
Acadian Flycatcher (<i>Empidonax virescens</i>)	Local viability concern	Yes	No	No	No	S4B/-	G5
Kentucky Warbler (<i>Oporornis formosus</i>)	Local viability concern	Yes	No	No	No	S4B/-	G5
Red-cockaded Woodpecker (<i>Picoides borealis</i>)	Federally Endangered	Yes	No	No	No	S2/S1	G3
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	Local viability concern	Yes	No	No	No	-/-	G5
White-eyed Vireo (<i>Vireo griseus</i>)	Local viability concern	Yes	No	No	No	S4B, S4N/-	G5
Cerulean Warbler (<i>Dendroica cerulea</i>)	Local viability concern	Yes	No	No	No	S2/S2B	G4
Prothonotary Warbler (<i>Protonotaria citrea</i>)	Local viability concern	Yes	No	No	No	S4B/-	G5

Common Name (Scientific Name)	Viability Concern	BCC	MIS	D	E	State Rank (AR/OK)	Global Rank
Swainson's Warbler (<i>Limnothlypis swainsonii</i>)	Local viability concern	Yes	No	No	No	S3/S1	G4
Northern Bobwhite (<i>Colinus virginianus</i>)	Local viability concern	Yes	Yes	Yes	No	S5/-	G5
Hooded Warbler (<i>Wilsonia citrina</i>)	Local viability concern	Yes	No	No	No	S4B/S2B	G5
Bachman's Sparrow (<i>Aimophila aestivalis</i>)	RF Sensitive	Yes	No	No	No	S3/S2?	G3
Painted Bunting (<i>Passerina ciris</i>)	Local viability concern	Yes	No	No	No	-/-	G5
Piping Plover (<i>Charadrius melodus</i>)	Federally Endangered	Yes	No	No	No	-/-	G3
Migrant Loggerhead Shrike (<i>Lanius ludovicianus migrans</i>)	RF Sensitive	Yes	No	No	No	-/-	G4T3Q
Orchard Oriole (<i>Icterus spurius</i>)	Local viability concern	Yes	No	No	No	S4B/-	G5
Worm-eating Warbler (<i>Helminthos vermivorus</i>)	Local viability concern	Yes	Yes	No	No	S4B/-	G5
Pileated Woodpecker (<i>Dryocopus pileatus</i>)	MIS	No	Yes	No	No	-/-	G5
Chuck-will's-widow (<i>Caprimulgus carolinensis</i>)	Local viability concern	Yes	No	No	No	S4B/-	G5
American Kestrel (<i>Falco sparverius</i>)	Local viability concern	Yes	No	No	No	-/-	G5
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Federally Threatened	Yes	No	No	No	S2B, S4N/-	G4
Interior Least Tern (<i>Sterna antillarum athalassos</i>)	Federally Endangered	Yes	No	No	No	S2B/-	G4T2Q
Eastern Wild Turkey (<i>Meleagris gallopavo</i>)	MIS	No	Yes	Yes	No	-/-	G5
Whip-poor-will (<i>Caprimulgus vociferus</i>)	Local viability concern	Yes	No	No	No	S4B/-	G5
Chimney Swift (<i>Chaetura pelagica</i>)	Local viability concern	Yes	No	No	No	-/-	G5
Scarlet Tanager (<i>Piranga olivacea</i>)	MIS	No	Yes	No	No	-/-	G5

Common Name (Scientific Name)	Viability Concern	BCC	MIS	D	E	State Rank (AR/OK)	Global Rank
Invertebrates							
Rich Mountain Slitmouth (<i>Stenotrema pilsbryi</i>)	RF Sensitive	No	No	No	Yes	S2/-	G2
Ouachita Slitmouth (<i>Stenotrema unciferum</i>)	Local viability concern	No	No	No	Yes	S?/-	G2
An Isopod (<i>Lirceus bicuspidatus</i>)	RF Sensitive	No	No	No	Yes	S3/-	G3Q
Diana (<i>Speyeria diana</i>)	RF Sensitive	No	No	No	No	S2S3	G3
American Burying Beetle (<i>Nicrophorus americanus</i>)	Federally Endangered	No	No	No	No	S1/S1	G2G3
Mammals							
Indiana Bat (<i>Myotis sodalis</i>)	Federally Endangered	No	No	No	No	S2/S1	G2
Rafinesque's Big-Eared Bat (<i>Corynorhinus rafinesquii</i>)	RF Sensitive	No	No	No	No	S2/-	G3G4
Eastern Small-Footed Bat (<i>Myotis leibii</i>)	RF Sensitive	No	No	No	No	S1/-	G3
Plains Spotted Skunk (<i>Spilogale putorius interrupta</i>)	Local viability concern	No	No	No	No	S?/-	G5T4
White-tailed Deer (<i>Odocoileus virginianus</i>)	MIS	No	Yes	Yes	No	-/-	G5
Mountain Lion (<i>Puma concolor</i>)	Local viability concern	No	No	No	No	SH/-	G5
Southeastern Myotis (<i>Myotis austroriparius</i>)	RF Sensitive	No	No	No	No	S2?/S2?	G3G4
Plants							
Scott's Spleenwort (<i>Asplenium x ebenoides</i>)	RF Sensitive	No	No	No	No	S1S2/-	HYB
Nuttall's Corn-Salad (<i>Valerianella nuttallii</i>)	RF Sensitive	No	No	No	No	S1/-	G1G2
Large-leaved Grass-of- Parnassus (<i>Parnassia grandifolia</i>)	Local viability concern	No	No	No	No	S3/-	G3
Ozark Chinquapin (<i>Castanea pumila</i> var <i>ozarkensis</i>)	RF Sensitive	No	No	No	No	S3S4/S2	G5T3
Rayless Crown-Beard (<i>Verbesina walteri</i>)	RF Sensitive	No	No	No	No	S1/S1	G3?
Wolf Spikerush (<i>Eleocharis wolfii</i>)	Local viability concern	No	No	No	No	S2/-	G3?
Dryopteris (<i>Dryopteris x australis</i>)	RF Sensitive	No	No	No	No	S1/-	HYB

Common Name (<i>Scientific Name</i>)	Viability Concern	BCC	MIS	D	E	State Rank (AR/OK)	Global Rank
Open-ground Whitlow-grass (<i>Draba aprica</i>)	RF Sensitive	No	No	No	No	S2/S1	G3
Trelease's Larkspur (<i>Delphinium treleasei</i>)	RF Sensitive	No	No	No	No	S3/-	G3
Shinners' Sunflower (<i>Helianthus occidentalis</i> ssp. <i>plantagineus</i>)	RF Sensitive	No	No	No	No	S1/-	G5T2T3Q
Southern Lady's-Slipper (<i>Cypripedium kentuckiense</i>)	RF Sensitive	No	Yes	No	No	S3/S1	G3
Ouachita Bluet (<i>Houstonia ouachitana</i>)	RF Sensitive	No	No	No	Yes	S3/S1	G3
Waterfall's Sedge (<i>Carex latebracteata</i>)	RF Sensitive	No	No	No	Yes	S3/S2	G3
Bush's Poppymallow (<i>Callirhoe bushii</i>)	RF Sensitive	No	No	No	No	S3/-	G3
A Sandgrass (<i>Calamovilfa arcuata</i>)	RF Sensitive	No	No	No	No	S1/S2	G2
Grave's Spleenwort (<i>Asplenium x gravesii</i>)	RF Sensitive	No	No	No	No	S1/-	HYB
Ouachita Leadplant (<i>Amorpha ouachitensis</i>)	RF Sensitive	No	No	No	Yes	S3/S2	G3Q
Panicked False Indigo (<i>Amorpha paniculata</i>)	RF Sensitive	No	No	No	No	S1/-	G2G3
Moore's Larkspur (<i>Delphinium newtonianum</i>)	RF Sensitive	No	No	No	Yes	S3/-	G3
Maple-leaved Oak (<i>Quercus acerifolia</i>)	RF Sensitive	No	No	No	No	S1/-	G1
A Corn-Salad (<i>Valerianella palmeri</i>)	RF Sensitive	No	No	No	Yes	S3/S1	G3
Sand Grape (<i>Vitis rupestris</i>)	RF Sensitive	No	No	No	No	SR/-	G3
Ozark Least Trillium (<i>Trillium pusillum</i> var <i>ozarkanum</i>)	RF Sensitive	No	No	No	No	S3/S1	G3T3
Ozark Spiderwort (<i>Tradescantia ozarkana</i>)	RF Sensitive	No	No	No	No	S3/S1S2	G3
Arkansas Meadow-Rue (<i>Thalictrum arkansanum</i>)	RF Sensitive	No	No	No	No	-/S1	G2Q
Small-headed Pipewort (<i>Eriocaulon komickianum</i>)	RF Sensitive	No	No	No	No	S2/-	G2
A Goldenrod (<i>Solidago ouachitensis</i>)	RF Sensitive	No	No	No	Yes	S3/S1	G3
Narrowleaf Ironweed (<i>Vernonia lettermannii</i>)	RF Sensitive	No	No	No	Yes	S3/S?	G3
Heartleaf Leafcup (<i>Polymnia cossatotensis</i>)	RF Sensitive	No	No	No	Yes	S1/-	G1
Threadleaf Bladderpod (<i>Lesquerella angustifolia</i>)	RF Sensitive	No	No	No	No	-/S3	G3

Common Name (Scientific Name)	Viability Concern	BCC	MIS	D	E	State Rank (AR/OK)	Global Rank
Golden Glade Cress (<i>Leavenworthia aurea</i>)	RF Sensitive	No	No	No	No	-/S2	G2
Butternut (<i>Juglans cinerea</i>)	RF Sensitive	No	No	No	No	S3/-	G3G4
Browne's Waterleaf (<i>Hydrophyllum brownei</i>)	RF Sensitive	No	No	No	Yes	S1/-	G1
A Twistflower (<i>Streptanthus squamiformis</i>)	RF Sensitive	No	No	No	Yes	S2/S1	G2
Reptiles							
Western Diamondback Rattlesnake (<i>Crotalus atrox</i>)	Local viability concern	No	No	No	No	-/-	G5
Collared Lizard (<i>Crotaphytus collaris</i>)	Local viability concern	No	No	No	No	-/-	G5
American Alligator (<i>Alligator mississippiensis</i>)	Federally Threatened	No	No	No	No	S4/-	G5
Southern Prairie Skink (<i>Eumeces septentrionalis obtusirostris</i>)	Local viability concern	No	No	No	No	S3/-	G5T5
Great Plains Skink (<i>Eumeces obsoletus</i>)	Local viability concern	No	No	No	No	-/-	G5
Razorback Musk Turtle (<i>Sternotherus carinatus</i>)	Local viability concern	No	No	No	No	S3/-	G5
Timber Rattlesnake (<i>Crotalus horridus</i>)	Local viability concern	No	No	No	No	-/-	G4
Mississippi Green Water Snake (<i>Nerodia cyclopion cyclopion</i>)	Local viability concern	No	No	No	No	S4/-	G5

Terrestrial Species Methodology

Species viability and habitat condition benchmarks (scoring) were derived using the most current science, literature and expert opinion best reflecting natural processes at work within the natural diversity of native plant and animal communities and best supporting the viability of associated species and their habitat needs. Complete literature citations (not presented here) are contained within the SVE itself, available online at www.aokforests.com or upon request; brief citations (author, year) are included in Appendix E. The effects of alternatives were analyzed in terms of how well the alternative approached the “good” or “very good” viable condition of the Conservation Targets. Ranges and definitions of terrestrial species SVE scores are shown in Table 3.56. Species viability scores were determined as a reflection of the condition scores of the combined associated Conservation Targets or habitat condition, as well as weighted by how important the habitat is to that species (obligate, optimal, marginal, suitable). For a complete list of Conservation Targets and associated species, see Appendix E.

Table 3.56 Ranges of Condition Score, Condition Classification, and Definitions of SVE Scores

Ranges of Condition Score	Condition Classification	Definitions of Terrestrial Species SVE Score
3.51-4.0	Very Good	(VIABLE) Habitat and/or population conditions are optimal. Species should remain robust and potentially even expand within suitable habitat.
2.51 - 3.50	Good	(VIABLE) Habitat and/or population conditions are acceptable. Species should remain stable.
1.51 – 2.50	Fair	(NON-VIABLE) Habitat and/or population conditions are slightly inadequate. Although species may persist for some time, they may be subject to gradual declines.
1.0 - 1.50	Poor	(NON-VIABLE) Habitat and/or population conditions are severely inadequate. Species are expected to decline rapidly and localized extirpations are occurring or are imminent.

Terrestrial and Aquatic-Associated Terrestrial Federally Proposed, Endangered, and Threatened Species List

There are five federally Endangered and two federally Threatened terrestrial species listed as occurring or potentially occurring within the Forest. At present, no species known to occur on the Forest are proposed for federal listing. The four listed birds, one mammal, one insect, and one reptile species are shown in the following tabulation:

Common Name and Scientific Name	Federal Listing
Least Tern (<i>Sterna antillarum</i>)	Endangered
Piping Plover (<i>Charadrius melodus</i>)	Endangered
American Alligator (<i>Alligator mississippiensis</i>)	Threatened by similarity of appearance (to other listed crocodilians)
Indiana Bat (<i>Myotis sodalis</i>)	Endangered
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Threatened
American Burying Beetle (<i>Nicrophorus americanus</i>)	Endangered
Red-cockaded Woodpecker (<i>Picoides borealis</i>)	Endangered

Least tern (*Sterna antillarum*) and Piping plover (*Charadrius melodus*)

Affected Environment

Most least terns and piping plovers that occur on the Ouachita National Forest in Arkansas and Oklahoma are passing migrants, but from May through September, a few nest in small colonies on exposed sandbars in the Arkansas, Mississippi, White, and Red Rivers and are regularly seen foraging within the Red Slough WMA. Arkansas nesting habitat is threatened by manipulation of river flows. Reduced flows allow encroachment of woody vegetation, eliminating some bare

sandbars. High flows during nesting wash away eggs and drown chicks. Nests are also lost to dredging operations, trampling by cattle, all-terrain vehicle use, storms, and predation.

Direct, Indirect, and Cumulative Effects

The least tern and piping plover nest on sandbars of large rivers and may seasonally occur as possible migrants, but are not known to occur as reproducing populations on the Forest (James and Neal 1986; Peterson 1980). There is no known or potential large river sandbar habitat on the Forest; therefore, there should be no direct, indirect, or cumulative effects from Forest management activities on these species. There are no known element occurrences on the Forest; therefore, these species were not included in the SVE analysis.

American Alligator (*Alligator mississippiensis*)

Affected Environment

The American alligator ranges across southeastern North America. With enforcement of protective legislation, populations have shown rapid recovery from habitat loss and over hunting and are stable or increasing in most of its range. Even though the American alligator is no longer biologically endangered or threatened, it is still listed by the USFWS as Threatened throughout its entire range due to the similarity of appearance to other endangered or threatened crocodilians. It now seems secure from extinction and was pronounced fully recovered in 1987.

Alligators play a vital role in wetland wildlife communities. Their deep water holes are important for other wildlife, especially during drought. They help control populations of many nuisance animals and are also valuable for biomedical studies. The only suitable or potential habitat for this species occurring on the Forest is within the West Gulf Coastal Plain Wet Hardwood Flatwoods of the Red Slough Wildlife Management Area (WMA) of southeastern Oklahoma, where it has been observed in streams and ditches that run through the WMA. At least one alligator has also been observed in Broken Bow Lake in Oklahoma, but there is little, if any suitable habitat for this species on nearby National Forest System land. This species is not been known to reproduce on the Forest; therefore, this species was not included in the SVE analysis.

Direct, Indirect, and Cumulative Effects

The primary threat to the American alligator on the Forest is loss of habitat and/or habitat degradation within the Red Slough WMA. Since the Red Slough WMA is slated for continued and enhanced maintenance as a wildlife emphasis area under all alternatives, there would be no negative direct, indirect, or cumulative effects on this species in any of the alternatives.

Indiana Bat (*Myotis sodalis*)

Affected Environment

All current habitat use and distribution data for the Indiana bat, in combination with extensive District, Forest and regional surveys, a recent Anabat (acoustic detection) survey conducted during the maternity period, and captures during the 2003 and 2005 Ouachita Mountain Bat Blitzes have failed to locate this species in the Arkansas portion of the Forest or adjacent lands. Gardner and Cook (2002) published data from the Indiana bat Recovery Team and other sources in the scientific literature that show there are no records of this species reproducing in Arkansas or Oklahoma, and that Indiana bats typically travel north from winter hibernacula (located in the Ozarks and in southeastern Oklahoma), not south into the Ouachita Mountains.

Indiana bats occasionally hibernate in small numbers (no more than ten bats) in Bear Den Caves on the Forest in eastern Oklahoma, but have not been detected there during the breeding season. Bear Den Caves represent the only natural cave habitat occurring on the Forest, and are within the Winding Stair National Recreation Area. Very little active management activity occurs near the caves other than protection of the cave habitat by gating. Based on the SVE, the Indiana bat habitat on the Forest scores "Good" (2.86).

Direct, Indirect, and Cumulative Effects

Direct effects to the Indiana bat would be disturbance and habitat degradation from human intrusions at Bear Den Caves, the only suitable hibernation site known to occur on the Forest. Because Bear Den Caves are in the Winding Stair National Recreation Area, vegetation management activities are minimal. Bear Den Caves are slated for continued protection from disturbance under all alternatives, the effects on this hibernation site from all of the alternatives would be protection of the desired habitat.

Indirect effects in the general forest area would be enhancement or development of potential summer roost and foraging habitat. Although Indiana bats are not known to occur on the Ouachita National Forest during maternity periods, potential roost and foraging habitat could benefit from properly implemented prescribed fires including improvement of foraging habitat conditions and creation of additional roosts. The flame lengths of prescribed fires are not likely to have a direct effect on roost trees. Indiana bats would normally be absent from the general forest area during all dormant season fires. Alternative A actually degrades the current condition of potential roosting and foraging habitat; Alternatives B and D maintain the current condition. Implementation of Alternatives C and E could result in the highest levels of vegetation management and possible effects to potential roost trees at the landscape scale.

For Alternative A, potential summer roosting and foraging habitat would be degraded, but for Alternatives B, C, D and E, the determination of effect is not likely to adversely affect Indiana bat. Management direction addresses the critical needs for habitat and protection of the Indiana bat and should improve or maintain foraging, roosting and hibernacula habitat conditions for this species. Additional site-specific analysis would be conducted on all projects with the potential for affecting this species.

Bald Eagle (*Haliaeetus leucocephalus*)

Affected Environment

The bald eagle is a fairly common local migrant and winter resident around lakes and large rivers in Arkansas. Numbers have grown since the bald eagle was listed as Endangered, and the federal listing has now been changed to Threatened. Eagles often perch on exposed limbs of tall trees near water. They feed on fish, water birds, small mammals, and carrion. The breeding territory for most of the local population is in the northern United States and Canada. Bald eagles are known to regularly use three bald eagle nests around Lake Ouachita on the Womble Ranger District (RD), Jessieville RD, and on the Poteau RD, where bald eagles have nested since 2000 near Lake Hinkle. Bald eagles utilize large trees near water as nest sites, as well as roosting sites in winter. This habitat element (large trees near water) scored 2.75 (Good) in the SVE process.

Direct, Indirect, and Cumulative Effects

Direct effects to bald eagles, in the form of fatalities to individual birds, are not likely to occur through normal management actions and activities occurring on the Ouachita National Forest.

Indirect effects to bald eagles and their habitat could occur. Negative indirect effects include disturbance that would result in breeding or nesting failure, and alteration of occupied habitats. Timber harvesting or road building activities have the potential to impact the bald eagle or its habitat, should it occur near streams, lakes, or other wetlands. Human disturbance from roads, trails, and campgrounds can also adversely affect the use of an area for nesting or roosting by eagles. Beneficial indirect effects could result through the protective emphases in Streamside Management Areas (SMAs). The primary threat to the bald eagle on the Forest is habitat degradation from loss of large trees near water. The SMAs of streams, rivers, and lakes are unsuitable for timber production under all alternatives. Management activities within these SMAs are limited to forest health issues; therefore, large trees near water are likely to benefit under all alternatives.

Cumulative effects to bald eagle populations are expected to be negligible under all alternatives. Recovery plan direction would be used for establishing protection zones around bald eagle nests and communal roost sites under all alternatives. Management Area 9-Water and Riparian Communities emphasizes low levels of disturbance and maintenance of mature forest. Thus, the effects on bald eagle habitat from all of the alternatives except Alternative A would be maintenance or enhancement of the desired habitat.

Because this management direction addresses critical needs for habitat and protection of roosts and nests from human disturbance, Alternatives B, C, D and E are not likely to adversely affect the bald eagle, and should provide conditions beneficial to this species. Additional site-specific analysis would be conducted on all projects with the potential for affecting this species.

American Burying Beetle (*Nicrophorus americanus*)

Affected Environment

The American burying beetle (ABB) is a large, black-and-orange carrion beetle once found in 32 states and Canada but now known only in Arkansas, Oklahoma, Nebraska and Rhode Island. Specimens have been documented in nine Arkansas counties, with the largest numbers in Fort Chaffee and on the Ouachita National Forest. Surveys have been conducted for the American burying beetle (ABB) across the Forest, but more intensively in Ranger Districts (RDs) and counties having known occurrences—the Poteau and Cold Springs RD in Arkansas and the Tiak, Choctaw, and Kiamichi RDs in Oklahoma. In Oklahoma, ABBs have been documented on the Forest in LeFlore and McCurtain Counties.

Reasons for the decline of this species are not well understood, but habitat fragmentation and pesticides are possible contributing factors. This insect feeds primarily on carrion from bodies of small vertebrates that it buries and later uses for food for hatching larvae. Like other carrion beetles, burying beetles play an important role in ecosystems, serving as scavengers responsible for recycling dead or decaying materials. Predators and scavengers such as American crow, raccoon, fox, opossum, and skunk compete with ABB for carrion. Competition for carrion within the genus *Nicrophorus* and within the species *N. americanus* is documented. There are no known incidences of mammalian or bird predation on the beetles.

American burying beetles are known to particularly utilize the grass/forb/shrub seral stages of pine-oak or oak-pine dominated open and closed canopy forests, mesic hardwood forests, dry-mesic oak forests, and dry oak woodland habitat on the Forest. The combined associated habitat for the ABB on the Forest scored 2.50 (Fair) in the Species Viability Evaluation.

Direct, Indirect, and Cumulative Effects

The ABB's decline throughout the range has been attributed to a variety of factors, including decreasing populations of the small mammals and birds necessary for successful rearing of its larvae, and competition with vertebrate scavengers for small carrion. Contrary to the earlier belief that the ABBs were associated with eastern deciduous woodlands, it is now apparent that carrion availability (appropriate in size as well as numbers) is more important than the type of vegetation or soil structure.

Since 1992, the Forest has conducted numerous and comprehensive surveys on National Forest System lands for the American burying beetle, in accordance with USFWS protocol. These surveys have confirmed continued existence of occurrence in the known historic counties of Arkansas (Scott, Logan, Sebastian), as well as Oklahoma (LeFlore and McCurtain). However, ABB have not been found to occur in any other counties within the Ouachita NF, even after well over 12,000 trap night surveys.

The counties of confirmed historical and existing ABB occurrence as previously listed, are designated as the American Burying Beetle Area (ABBA) and are evaluated separately from the rest of the Ouachita NF. Any given NF project will then either be within the ABBA or outside of the ABBA.

As there are no known occurrences of American burying beetles outside of the ABBA in those counties with NF lands, all alternatives will have no effect in these areas. Periodic surveys will continue to be conducted on the NF lands outside of the ABBA, in accordance with US Fish and Wildlife Service monitoring protocols. If any American burying beetles are found to occur outside of the historic counties, then that county will be added to the American Burying Beetle Area, and management activities will be planned and implemented in accordance with the most current Forest Plan and USFWS direction.

Direct effects from all alternatives would include ground disturbing activities that may result in harm to ABB individuals, as buried carrion is the substrate of choice for depositing their eggs. Ground disturbing activities that could potentially harm ABB individuals include some forest harvesting and regeneration site preparation activities, and construction, reconstruction, maintenance or decommissioning of roads, firelines, trails, and facilities. Direct effects to individual ABBs would be reduced or minimized by following the US Fish and Wildlife Service bait-away or trap-and-relocate protocols prior to implementation of "ground-disturbing" management activities in project areas.

Generally, the indirect effects of forest management activities will be beneficial to American burying beetle habitat in all of the alternatives. Increased establishment and maintenance of early seral habitat will provide enhanced habitat for the ABB prey base of small vertebrate carrion production. Indirect beneficial effects on ABB habitat would primarily involve maintenance and/or enhancement of the grass/forb/shrub vegetation condition that harbors small mammal and other potential carrion populations. The cumulative effects of forest management activities in the Selected Alternative on ABB habitat would be continued enhancement of grass/forb habitat, providing conditions beneficial to this species, but ground-disturbing activities may harm individuals.

For all alternatives, a determination of "likely to adversely affect" is made for the American burying beetle within the Ouachita NF American Burying Beetle Area because ground disturbing activities

may harm individuals and, even when Baiting Away or Trapping and Relocating protocols are implemented, not all ABBs would be removed.

Red-cockaded Woodpecker (*Picoides borealis*)

Affected Environment

In the mid-1800s, John J. Audubon described the Red-cockaded Woodpecker (RCW) as abundant in Southern pine forests. Today, 10,000 to 14,000 individuals remain, living in a fragmented range in the southeastern United States. Unlike other woodpeckers, the Red-cockaded Woodpecker roosts in cavities in live pines requiring 80 to 120-year-old pines for its cavities, and extensive pine and pine-hardwood forests to meet its foraging needs. Much of the Southeast has been cleared for agriculture. Many remaining pine forests are unsuitable for the Red-cockaded Woodpecker. Because of the drastic loss and continued decline of habitat through out the range, the bird is Endangered.

Historically, RCWs occurred in pine forests of numerous species, ranging in the eastern United States from New Jersey south through Florida, and west from Missouri through Oklahoma and Texas. By the time RCWs were listed as Endangered, suitable habitat had shrunk to 1 percent or less of its historic levels, with predictable declines in the numbers of birds. Surveys in Arkansas in the 1970s and 1980s revealed a population of at most a few hundred birds confined to public lands and scattered holdings of timber companies.

Basic biological and population data about RCWs have appeared in many technical publications. Included are data for the Ouachita NF and the Ouachita Mountains in Oklahoma (McCurtain County Wilderness Area). Currently, the only active RCW clusters on the Forest are limited to restored shortleaf pine-bluestem communities within Management Area 22 in Arkansas. There are also three active RCW clusters on the Crossett Experimental Forest in Crossett, Arkansas, that are considered stable.

Within the MA 22 area in Arkansas, there has been a steady increase in the number of active RCW clusters, from 10 to 35 clusters from 1990 to 2004. The current SVE score for RCWs within MA 22 on the Forest is 2.50 (Fair), in association with the current pine-bluestem ecosystem restoration.

Direct, Indirect, and Cumulative Effects

Direct effects to Red-cockaded Woodpeckers could include mortality of individuals during capture, handling, translocation, or prescribed fire. Prescribed fire, even when employed within prescription and Revised Recovery Plan guidelines, could result in the loss of individuals if nest trees are burned during nesting season. However, for the period of 1998-2002, RCW habitats managed with prescribed fire included 6,195 active clusters with no losses of nests (Costa 2003). The Revised Recovery Plan increases the protection standard (area raked around each roost tree) above those used during the compilation of the data cited above. Therefore, the potential for mortality to Red-cockaded Woodpeckers during nesting season due to prescribed fire is deemed insignificant and discountable, with standard mitigations given in the Recovery Plan. Losses of individual cavity trees to fire can be compensated by installation of artificial cavities. Avoidance of prescribed fires during the nesting season is not recommended, since nesting season coincides with timing favorable for other important ecological fire effects.

Indirect effects to Red-cockaded Woodpeckers occur at the landscape level and at the population level. There will be beneficial effects of the habitat management actions to Red-cockaded Woodpecker habitats and populations. Detrimental habitat isolation and fragmentation effects will be reduced as suitable habitat areas are enlarged and joined across the Habitat Management

Areas. Population expansion will be fostered by: restoration of off-site pine stands with native pine species; regeneration of limited mature pine stands with retention of potential roost trees; thinning of mid-successional and mature pine and pine-hardwood stands; prescribed fire to remove encroaching woody vegetation and restore herbaceous groundcovers; chemical and mechanical treatment of encroaching midstory where fire is not a viable management tool; installation of artificial roosting and nesting cavities; protection of artificial and natural cavities from competitors through the installation of excluder devices; capture, banding and monitoring of individual birds to facilitate monitoring of the population; and translocation of birds as necessary to optimize annual reproduction.

Cumulative effects to Red-cockaded Woodpecker populations over the long-term (all alternatives) are expected to be population growth at rates prescribed in the Revised Recovery Plan, Recovery Plan population objective attainment, and ultimately, recovery of the species. Management of Red-cockaded Woodpecker populations on the Forest in Arkansas and Oklahoma, will be according to the RCW EIS Record of Decision and the Revised Recovery Plan, as required by the Endangered Species Act, and will not vary by alternative. Habitat Management Areas for Red-cockaded Woodpeckers have been established through direction in the EIS Record of Decision and Revised Recovery Plan for Red-cockaded Woodpeckers. Management direction has been incorporated into all alternatives, including the Selected Alternative, Alternative E, through the continued allocation of acres to Management Area 22, and through forest-wide protection of Endangered species.

Beneficial management actions required to implement the Revised Recovery Plan include: harvesting of timber, including thinning and regeneration; use of mechanical and chemical methods and prescribed fire for control of midstory and hardwood encroachment; the installation of artificial roosting and nesting cavities; protection of artificial and natural cavities from competitors through the installation of excluder devices; capture, banding, and monitoring of individual birds; translocation of birds from donor populations to recipient populations; and intra-population translocations, as necessary to optimize annual reproduction.

Mitigation actions required under the Revised Recovery Plan for habitat management include: protection of active and inactive cavity trees within burn units; utilization of two-aged regeneration methods rather than clear-cutting; rotation ages not less than 120 years for shortleaf pine; limitation of regeneration area size; and limitation of operable season to avoid nesting and brood-rearing periods in active clusters. Implementation of any alternative is not likely to adversely affect the Red-cockaded Woodpecker, as residual potential risks to individuals after full implementation of protective measures are insignificant and discountable. Additional site-specific analysis would be conducted on all projects with the potential to affect this species.

Summary of Viability Outcomes for Federally Listed Terrestrial Species

Figures 3.31 and 3.32 summarize the viability scores, by alternative, for federally listed terrestrial species that were included in the SVE. All alternatives are predicted to improve the viability score of the Red-cockaded Woodpecker, and Alternatives B, C, and E are predicted to improve the viability score for the American burying beetle by the 5th decade.

Viability Score for Terrestrial Threatened and Endangered Species by Alternative 10th Year

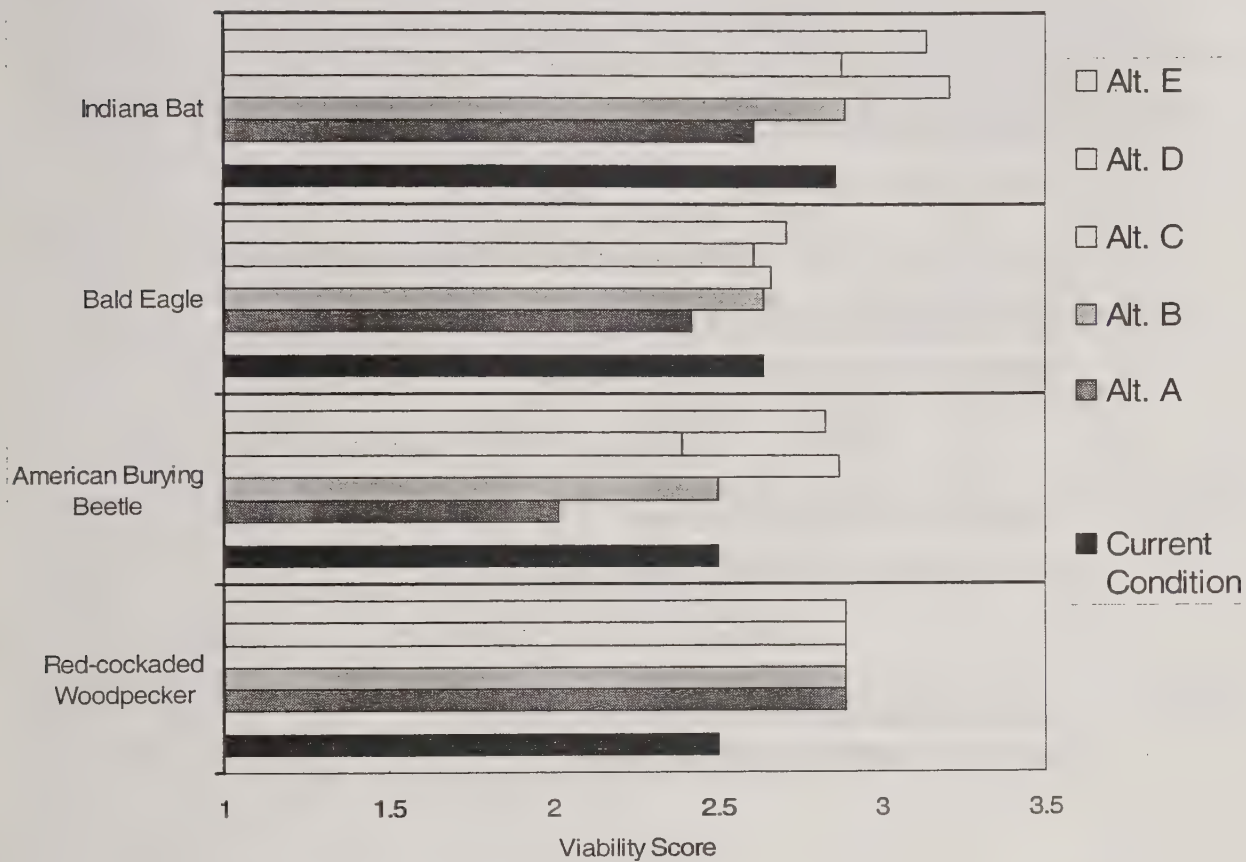


Figure 3.31 Viability Score for Terrestrial Threatened and Endangered Species by Alternative, 10th Year

Viability Score for Terrestrial Threatened and Endangered Species by Alternative 50th Year

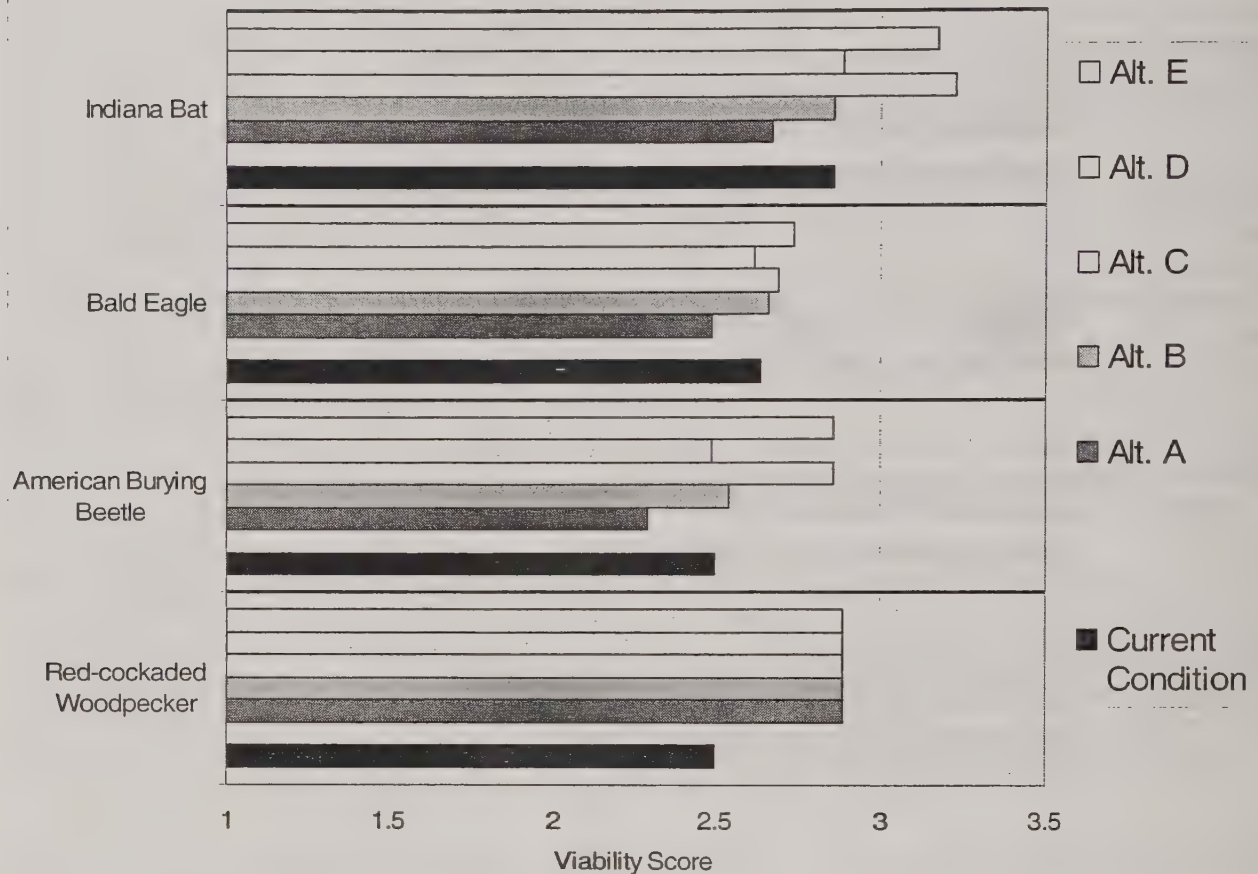


Figure 3.32 Viability Score for Terrestrial Threatened and Endangered Species by Alternative, 50th Year

Other Sensitive Terrestrial Species of Viability Concern

Other species of viability concern (Table 3.57) were analyzed separately from the Threatened and Endangered species. This list was derived based on recommendations from local flora and/or fauna experts, from the most current Partners In Flight and/or Birds of Conservation Concern lists, and from the Region 8 Sensitive Species List. Species are categorized as being Sensitive due to their endemic or restricted ranges, and/or current or predicted downward trends in population numbers and/or available habitat, which raises concern about long-term viability. For specific communities and/or habitat elements by species, see Appendix E.

Table 3.57 Other Terrestrial Species of Viability Concern and Current SVE Scores and Ratings for those species known to occur on the Forest

Common Name	Scientific Name	Weighted Viability Score	Rating
Mammals			
Southeastern Myotis	<i>Myotis austroriparius</i>	3.36	Good
Eastern Small-Footed Bat	<i>Myotis leibii</i>	3.31	Good
Plains Spotted Skunk	<i>Spilogale putorius interrupta</i>	2.86	Good
Birds			
Prothonotary Warbler	<i>Protonotaria citrea</i>	2.88	Good
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	2.82	Good
American Kestrel	<i>Falco sparverius</i>	2.75	Good
Chimney Swift	<i>Chaetura pelagica</i>	2.71	Good
Worm-eating Warbler	<i>Helmitheros vermivorus</i>	2.59	Good
Bachman's Sparrow	<i>Aimophila aestivalis</i>	2.59	Good
Swainson's Warbler	<i>Limnothlypis swainsonii</i>	2.56	Good
Yellow-throated Vireo	<i>Vireo flavifrons</i>	2.56	Good
Painted Bunting	<i>Passerina ciris</i>	2.56	Good
Acadian Flycatcher	<i>Empidonax vireescens</i>	2.50	Fair
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	2.50	Fair
Cerulean Warbler	<i>Dendroica cerulea</i>	2.50	Fair
Orchard Oriole	<i>Icterus spurius</i>	2.50	Fair
Brown-headed Nuthatch	<i>Sitta pusilla</i>	2.50	Fair
Bewick's Wren	<i>Thryomanes bewickii</i>	2.50	Fair
White-eyed Vireo	<i>Vireo griseus</i>	2.50	Fair
Wood Thrush	<i>Hylocichla mustelina</i>	2.50	Fair
Kentucky Warbler	<i>Oporornis formosus</i>	2.50	Fair
Northern Bobwhite	<i>Colinus virginianus</i>	2.50	Fair
Prairie Warbler	<i>Dendroica discolor</i>	2.50	Fair
Hooded Warbler	<i>Wilsonia citrina</i>	2.50	Fair
Whip-poor-will	<i>Caprimulgus vociferus</i>	2.48	Fair
Amphibians and Reptiles			
Razorback Musk Turtle	<i>Sternotherus carinatus</i>	3.50	Good
Northern Crawfish Frog	<i>Rana areolata circulosa</i>	3.48	Good
Strecker's Chorus Frog	<i>Pseudacris streckeri streckeri</i>	3.42	Good
Many-ribbed Salamander	<i>Eurycea multiplicata multiplicata</i>	3.10	Good
Mississippi Green Water Snake	<i>Nerodia cyclopion cyclopion</i>	3.00	Good
Ringed Salamander	<i>Ambystoma annulatum</i>	2.94	Good
Mole Salamander	<i>Ambystoma talpoideum</i>	2.86	Good
Ouachita Dusky Salamander	<i>Desmognathus brimeylorum</i>	2.67	Good
Rich Mountain Salamander	<i>Plethodon ouachitae</i>	2.67	Good
Caddo Mountain Salamander	<i>Plethodon caddoensis</i>	2.59	Good
Fourche Mountain Salamander	<i>Plethodon fourchensis</i>	2.59	Good
Sequoyah Slimy Salamander	<i>Plethodon sequoyah</i>	2.59	Good
Kiamichi Mountain Salamander	<i>Plethodon kiamichi</i>	2.59	Good
Four-toed Salamander	<i>Hemidactylium scutatum</i>	2.59	Good
Southern Prairie Skink	<i>Eumeces septentrionalis obtusirostris</i>	2.50	Fair

Common Name	Scientific Name	Weighted Viability Score	Rating
Southern Redback Salamander	<i>Plethodon serratus</i>	2.50	Fair
Bird-voiced Tree Frog	<i>Hyla avivoca</i>	2.50	Fair
Timber Rattlesnake	<i>Crotalus horridus</i>	2.50	Fair
Great Plains Skink	<i>Eumeces obsoletus</i>	2.50	Fair
Western Diamondback Rattlesnake	<i>Crotalus atrox</i>	2.40	Fair
Collared Lizard	<i>Crotaphytus collaris</i>	2.00	Fair
Invertebrates			
Ouachita Slitmouth	<i>Stenotrema unciferum</i>	2.93	Good
An Isopod	<i>Lirceus bicuspidatus</i>	2.90	Good
Diana Fritillary	<i>Speyeria diana</i>	2.50	Fair
Rich Mountain Slitmouth	<i>Stenotrema pilsbryi</i>	2.00	Fair
Plants			
Arkansas Meadow-Rue	<i>Thalictrum arkansanum</i>	3.50	Good
Threadleaf Bladderpod	<i>Lesquerella angustifolia</i>	3.50	Good
Golden Glade Cress	<i>Leavenworthia aurea</i>	3.50	Good
Narrowleaf Ironweed	<i>Vernonia lettermannii</i>	3.50	Good
A Sandgrass	<i>Calamovilfa arcuata</i>	3.50	Good
Sand Grape	<i>Vitis rupestris</i>	3.50	Good
Moore's Larkspur	<i>Delphinium newtonianum</i>	3.08	Good
Ouachita Bluet	<i>Houstonia ouachitana</i>	2.67	Good
Bush's Poppymallow	<i>Callirhoe bushii</i>	2.67	Good
Wolf Spikerush	<i>Eleocharis wolfii</i>	2.67	Good
Butternut	<i>Juglans cinerea</i>	2.67	Good
Rayless Crown-Beard	<i>Verbesina walteri</i>	2.67	Good
Ozark Spiderwort	<i>Tradescantia ozarkana</i>	2.67	Good
Small-headed Pipewort	<i>Eriocaulon kornickianum</i>	2.67	Good
A Corn-Salad	<i>Valerianella palmeri</i>	2.63	Good
Browne's Waterleaf	<i>Hydrophyllum brownei</i>	2.58	Good
A Goldenrod	<i>Solidago ouachitensis</i>	2.53	Good
Large-leaved Grass-of-Parnassus	<i>Parnassia grandifolia</i>	2.50	Fair
Ouachita Leadplant	<i>Amorpha ouachitensis</i>	2.50	Fair
Ozark Chinquapin	<i>Castanea pumila var ozarkensis</i>	2.50	Fair
Southern Lady's-Slipper	<i>Cypripedium kentuckiense</i>	2.50	Fair
Waterfall's Sedge	<i>Carex latebracteata</i>	2.50	Fair
Heartleaf Leafcup	<i>Polymnia cossatotensis</i>	2.50	Fair
Dryopteris	<i>Dryopteris x australis</i>	2.50	Fair
Ozark Least Trillium	<i>Trillium pusillum var ozarkanum</i>	2.47	Fair
A Twistflower	<i>Streptanthus squamiformis</i>	2.46	Fair
Shinners' Sunflower	<i>Helianthus occidentalis ssp plantagineus</i>	2.44	Fair
Nuttall's Corn-Salad	<i>Valerianella nuttallii</i>	2.00	Fair
Maple-leaved Oak	<i>Quercus acerifolia</i>	2.00	Fair
Open-ground Whitlow-grass	<i>Draba aprica</i>	2.00	Fair

The current SVE scores reflect that 45 species scored “good;” and 35 species scored “fair.” Of the 35 species that scored fair, 25 scored 2.50 which is the highest score within the fair ranking. Five of the remaining fair species scored above 2.40, and the remaining fair species scored 2.00. There were no species that scored lower than 2.00, and no species scored “Poor.” Figures 3.33 and 3.34 shows the number of other terrestrial species of viability concern per condition class by alternative for the 10th year and 50th year.

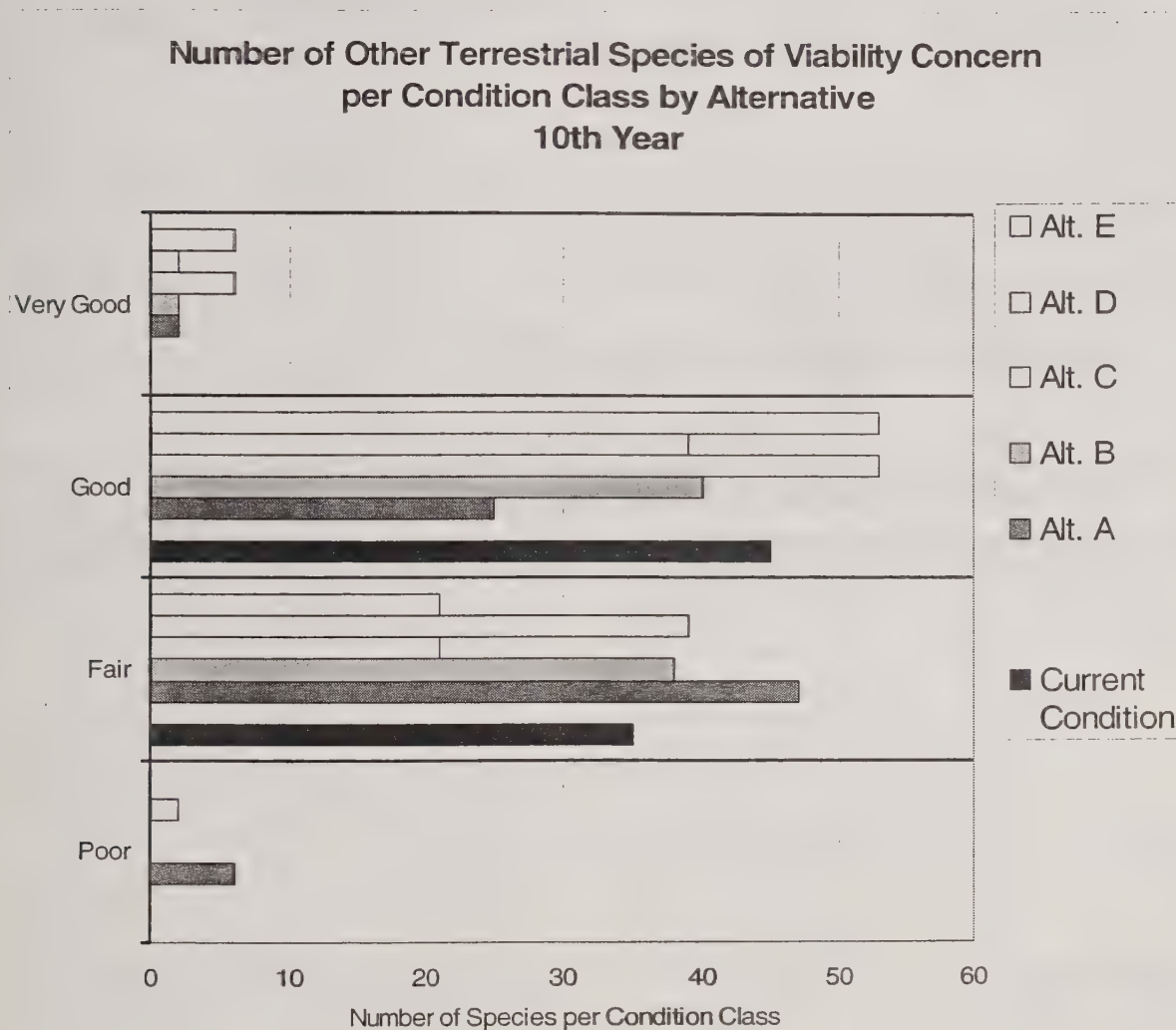


Figure 3.33 Number of Other Terrestrial Species of Viability Concern per Condition Class by Alternative, 10th Year

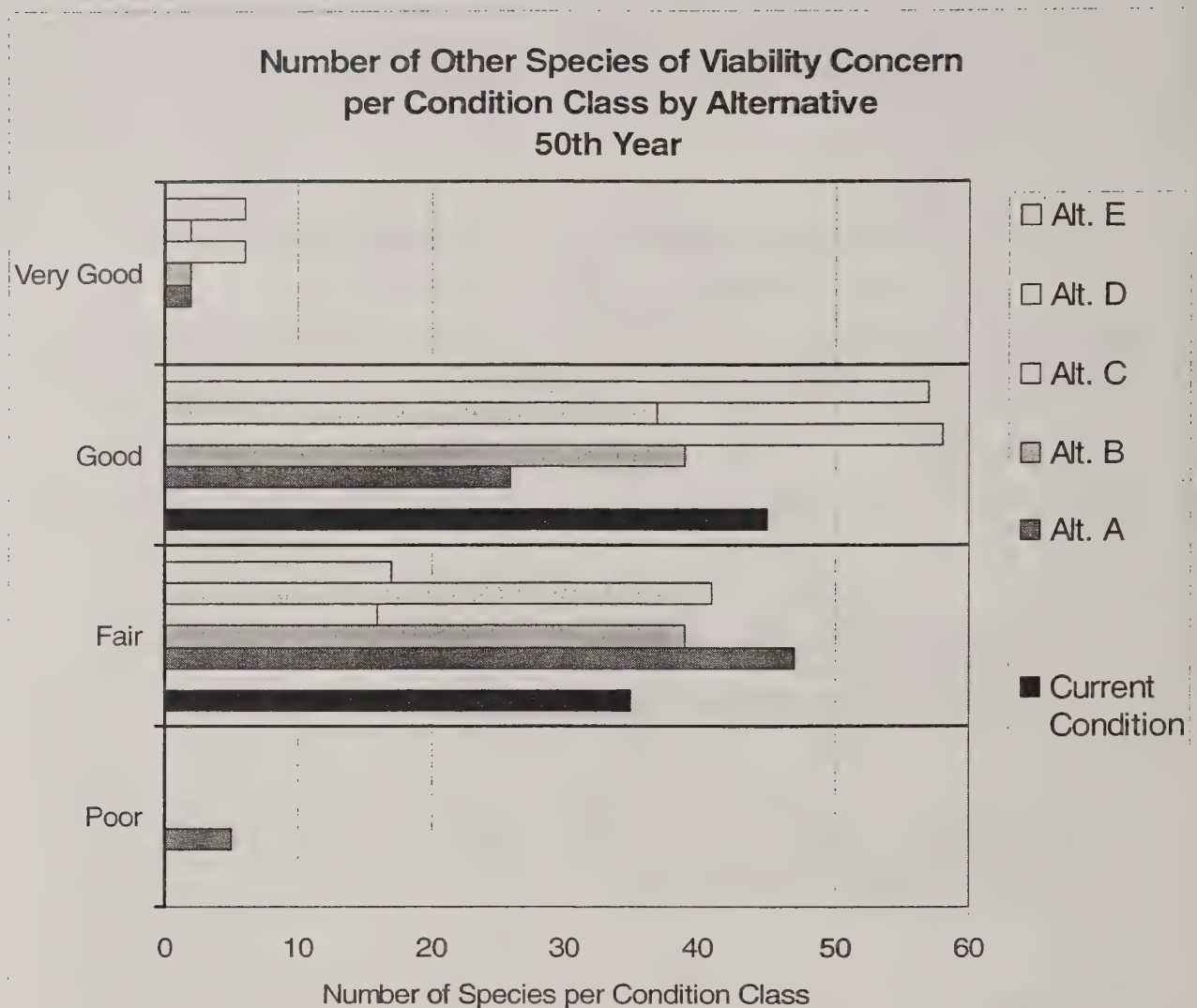


Figure 3.34 Number of Other Terrestrial Species of Viability Concern per Condition Class by Alternative, 50th Year

Management Indicator Species

Management indicator species (MIS) are analyzed separately from the Threatened, Endangered, and Sensitive Species. Northern bobwhite and Red-cockaded Woodpecker were included in the SVE and as MIS. Red-cockaded Woodpecker was previously discussed in the terrestrial endangered species section. National Forest Management Act regulations, adopted in 1982, require selection of management indicator species (MIS) during development of forest plans (36 CFR 219.19(a)). Reasons for their selection must be stated. The "Management Indicator Species Selection Process Paper" describes the process and rationale used to select MIS for this cycle of Plan revision.

Management indicator species (MIS) are to be selected "because their population changes are believed to indicate the effects of management activities" (36 CFR 219 (a)(1)). They are to be used during planning to help compare effects of alternatives (36 CFR 219.19(a)(2)), and as a focus for

monitoring (36 CFR 219.19(a)(6)). Where appropriate, MIS shall represent the following groups of species (36 CFR 219 (a)(1)):

- Threatened and Endangered species on State and Federal lists
- Species with special habitat needs
- Species commonly hunted, fished, or trapped
- Non-game species of special interest
- Species selected to indicate effects on other species of selected major biological communities

Since adoption of these regulations, the management indicator species concept has been reviewed and critiqued by the scientific community. These reviews identify proper uses and limitations of the indicator species concept. They generally caution against overreaching in the use of indicator species, especially when making inferences about ecological conditions or status of other species within a community. Caution is needed because many different factors may affect populations of each species within a community, and each species' ecological niche within a community is unique. Table 3.58 shows the Terrestrial Management Indicator Species selected for use in the Ouachita National Forest and the primary reasons for their selection.

Table 3.58 Terrestrial Management Indicator Species selected for use and primary reason(s) for their selection, Ouachita National Forest.

Common Name	Scientific Name	Primary reason(s) for selection
Northern bobwhite	<i>Colinus virginianus</i>	To help indicate effects of management on meeting public hunting demand, and to help indicate effects of management on the pine-oak woodland community
White-tailed deer	<i>Odocoileus virginianus</i>	To help indicate effects of management on meeting public hunting demand
Eastern wild turkey	<i>Meleagris gallapavo</i>	To help indicate effects of management on meeting public hunting demand
Red-cockaded Woodpecker	<i>Picoides borealis</i>	To indicate effects of management on recovery of this Endangered species, and to help indicate effects of management on shortleaf pine-bluestem woodland community
Pileated woodpecker	<i>Dryocopus pileatus</i>	To help indicate effects of management on snags and snag-dependent species
Scarlet tanager	<i>Piranga olivacea</i>	To help indicate effects of management on mature forest communities
Prairie warbler	<i>Dendroica discolor</i>	To help indicate effects of management on the early successional component of forest communities

Table 3.59 presents terrestrial habitat capability for terrestrial Management Indicator Species by alternative. For the scarlet tanager, habitat capability changes little over the first 10-year period (some decline in Alternative C, modest increases in Alternatives B and E); after 50 years, all alternatives show increased habitat capability for this species when compared to the 1st decade figure for Alternative A (1990 Forest Plan), with Alternatives A, B, and E showing the greatest relative increases. For the prairie warbler, eastern wild turkey, and Northern bobwhite, Alternative C clearly would provide the greatest habitat capability (at 10 and 50 years); Alternatives B and E, though, still provide greater habitat capability for these species than do Alternatives A or B. Habitat capability for the pileated woodpecker, on the other hand, is lowest under Alternative C (at 10 and 50 years) and highest under A and B, with values for Alternatives D and E not far behind.

Table 3.59 Terrestrial Habitat Capability per Square Mile for Management Indicator Species by Alternative after 10 Years and 50 Years

Species		Scarlet Tanager		Prairie Warbler		Pileated Woodpecker		Eastern Wild Turkey		Northern Bobwhite		White-tailed Deer	
Years		10	50	10	50	10	50	10	50	10	50	10	50
Alternatives	A	24.9	27.1	39.2	49.8	18.6	26.0	3.4	3.7	35.2	56.7	12.8	16.7
	B	25.2	27.5	30.9	51.4	18.7	26.7	2.7	3.1	29.1	54.3	13.2	18.3
	C	24.1	25.7	72.4	99.9	14.3	18.5	5.9	7.0	42.7	77.5	22.7	30.0
	D	24.9	26.8	40.1	65.9	17.8	23.8	3.2	3.4	37.8	69.2	13.4	19.9
	E	25.0	27.3	40.5	59.4	17.8	25.3	3.3	3.9	36.6	70.0	13.7	20.2

Figures 3.35 and 3.36 graphically illustrate the terrestrial habitat capability for Management Indicator Species by alternative.

Terrestrial Habitat Capability per Square Mile for Management Indicator Species by Alternative 10th Year

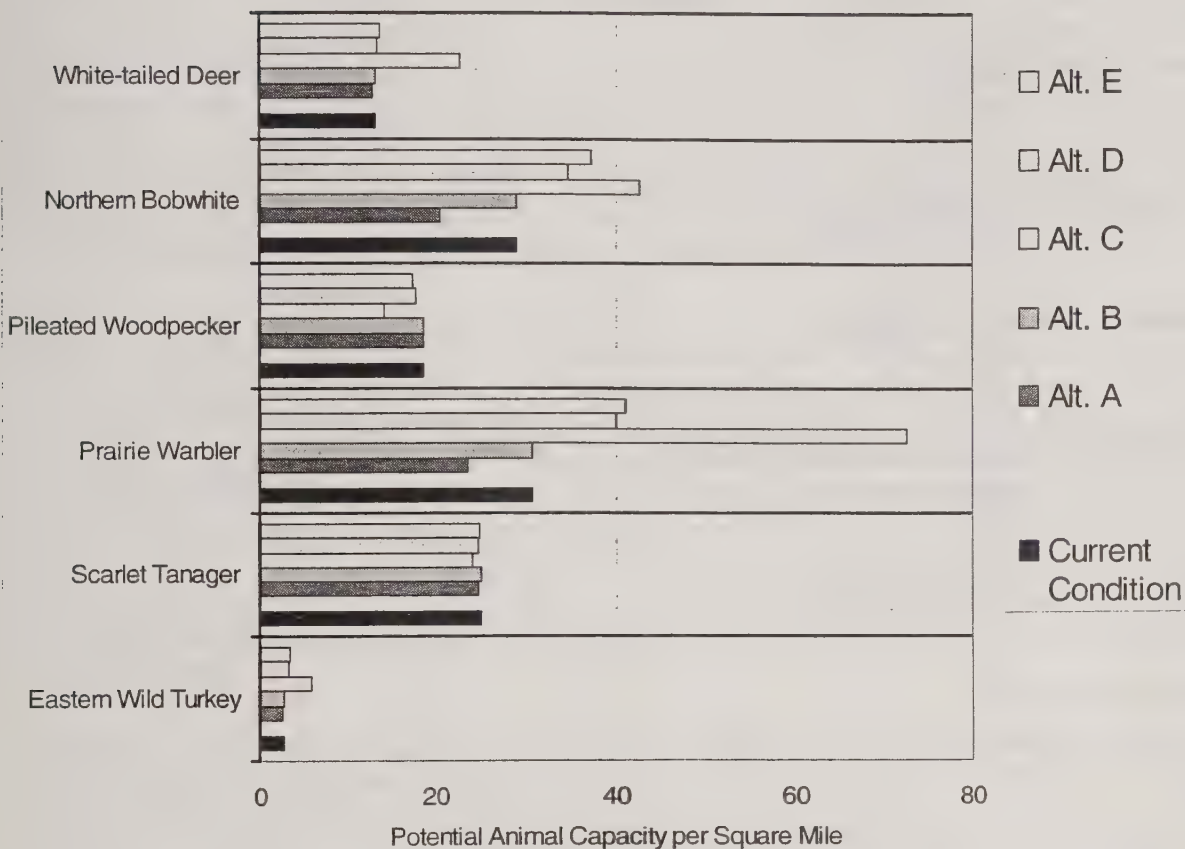


Figure 3.35 Terrestrial Habitat Capability per Square Mile for Management Indicator Species by Alternative, 10th Year

Terrestrial Habitat Capability per Square Mile for Management Indicator Species by Alternative 50th Year

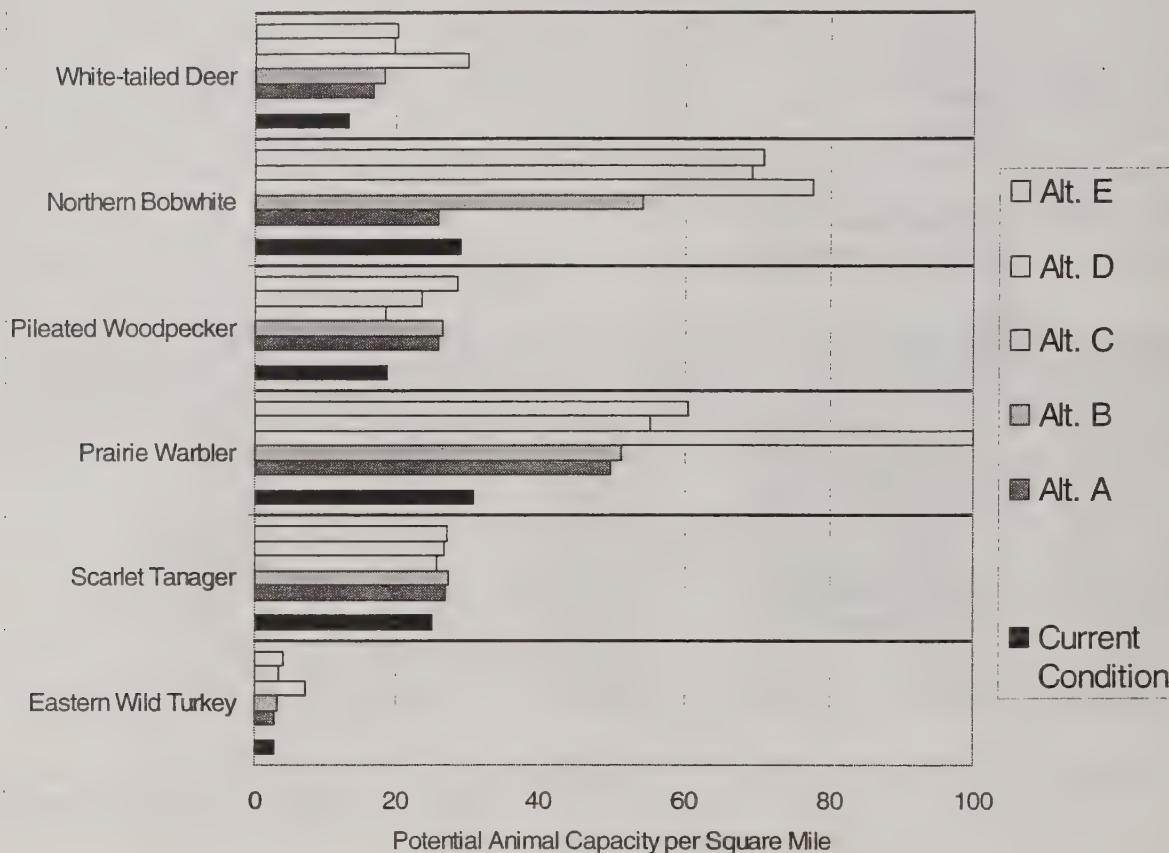


Figure 3.36 Terrestrial Habitat Capability per Square Mile for Management Indicator Species by Alternative, 50th Year

Direct, Indirect, and Cumulative Effects (for Other Sensitive Terrestrial Species of Viability Concern, and Management Indicator Species)

Under all alternatives, some individuals within a project area may be harmed directly by certain management activities; however, typically habitat enhancement benefits built into all projects are of greater importance to the population viability and persistence within the landscape. The indirect and cumulative effects on these species are indicated through the SVE scores for Other Sensitive Terrestrial Species of Viability Concern and Management Indicator Species and are directly related to the condition of the habitat. Therefore, the indirect and cumulative effects by alternatives to the community conditions and all species evaluated in this analysis are discussed here together. From the current condition, each of the alternatives would provide distinct differences in effects.

Alternatives will be described according to their patterns of influence to the following:

- Community health conditions
- Creation and maintenance of appropriate ratios of seral stages
- Threatened, Endangered and other species of viability concern SVE scores
- Habitat capability for management indicator species

These varying patterns of influence are reflections of the different intensity levels of management activities by alternative.

From current levels of vegetation management and emphasis, Alternative A would yield lower levels of forest health treatments, timber management activities, prescribed fire, and overall community health emphasis than the other alternatives. Management activities would emphasize the pine-dominated communities and provide few activities for maintenance and/or restoration of rare upland communities or the species that require those habitats. Cumulatively, Alternative A would produce lower health conditions for the communities, create and maintain less appropriate ratios of seral habitat, yield lower current SVE scores for most species of viability concern and lower habitat capability values for Prairie warbler and White-tailed deer in comparison to the other alternatives. However, habitat capability values for Scarlet tanager, Pileated woodpecker, and Eastern wild turkey are roughly comparable to those for Alternatives B, D, and E

Alternative B would be most similar to the current levels of vegetation management and community emphasis. This alternative would maintain current levels of forest health treatments, timber management, prescribed fire (averaging 100,000 to 125,000 acres per year), and overall community health emphasis. Management activities would primarily emphasize the pine-dominated communities, and provide some activities for maintenance and/or restoration of rare upland communities and the species that require those habitats. Cumulatively, Alternative B would maintain or degrade health conditions for various communities, create and maintain current ratios of seral habitat, maintain or lower current SVE scores for most species of viability concern, and maintain or lower current habitat capability values for MIS. Alternative B would produce the highest Scarlet tanager habitat capability of all alternatives after 50 years but the lowest capability for Northern bobwhite.

Alternative C would provide the highest levels of forest health treatments, timber management activities, prescribed fire (averaging 250,000 acres annually), and overall community health emphasis. Management activities would emphasize the health of all communities and provide activities for maintenance and/or restoration of rare upland communities and the species that require those habitats. Cumulatively, Alternative C would improve health conditions for the most communities; create and maintain appropriate ratios of seral habitat; and improve current SVE scores for the most species of viability concern of all the alternatives. Among terrestrial MIS, the Pileated woodpecker and Scarlet tanager would have the lowest habitat capabilities and the Prairie warbler, Eastern wild turkey, Northern bobwhite, and White-tailed deer would have the highest habitat capabilities under Alternative C.

Alternative D would provide higher levels of active vegetation management than Alternatives A and B, but lower levels than Alternatives C and E. Management activities would emphasize the pine-dominated communities and provide few opportunities for maintenance and/or restoration of rare upland communities or the species that require those habitats. Alternative D would maintain or enhance the current health conditions for pine/oak dominated communities and lower current health conditions for the rare upland communities, create and maintain less appropriate ratios of seral habitat, lower current SVE scores for species of viability concern associated with rare upland communities, but mostly improve habitat capability values for MIS. Alternative D would have the highest habitat capability for Pileated woodpecker after 50 years of Plan implementation and the second highest capability for Prairie warbler.

Compared to Alternatives A and B, Alternative E would provide high levels of forest health treatments, timber management activities, prescribed fire, and overall community health emphasis. Management activities would emphasize the health of all communities and provide activities for maintenance and/or restoration of rare upland communities and the species that require those habitats, as well as the pine/oak dominated communities. The pattern of influence for Alternative E

would improve current health conditions for all Ouachita Mountain communities, create and maintain appropriate ratios of seral habitat, improve current SVE scores for more species of viability concern than Alternatives A, B, or D, and maintain or improve habitat capability values for MIS. Among the terrestrial MIS, Alternative E would have the second highest habitat capability for Scarlet tanager and White-tailed deer and intermediate values (compared to the other alternatives) for the other terrestrial MIS.

Forest Health

Insect and Disease Concerns

In this section, biological threats to forest health are addressed, including outbreaks of insects and diseases, and intrusions by invasive, non-native species. Additional detailed descriptions of biological threats to forest resources are included in the Ozark-Ouachita Highlands Assessment, Terrestrial Report (USDA 1999e).

Native Insects and Diseases

Insects and diseases naturally occur in plant communities and are essential to maintaining a healthy forest system. Concerns about insects and diseases arise when they bring about or threaten to bring about radical changes in forest composition and/or structure. Examples of such radical changes include the extensive outbreaks of gypsy moths and dogwood anthracnose disease in Eastern forests and periodic outbreaks of southern pine beetles in many Southern states. Forest management seeks to address detrimental effects of insects and diseases without interfering with their long-term beneficial effects. Potential for damage to forest communities depends upon community type and age, species composition, location on the landscape, current and past management practices, past disturbances, stress factors, and weather conditions.

Southern pine beetles (SPBs) periodically pose threats to forest resources. SPB generally attack older, densely populated stands that are stressed by drought conditions, poor soil conditions, absence of natural enemies, or other factors. About 68 percent of the forested acres within the Ouachita National Forest are pine-dominated, and epidemic outbreaks of SPB pose a serious threat to this resource.

Ips beetles are another genus of pine bark beetles that are native to the Forest. These beetles are highly destructive and second only to SPB in their capability to kill pine trees. Ips beetles usually attack pines that are recently dead, damaged, dying, or recently felled trees, and fresh logging debris. Frequently, three types of bark beetles will infest the same tree—the Ips beetle, the SPB, and the black turpentine beetle.

The black turpentine beetle, another native insect, also has the potential usually in conjunction with other bark beetles to cause extensive losses to pine forests. The black turpentine beetle seldom persists at a high population level, but when the beetle's population is increasing dramatically, it is capable of attacking healthy trees. Rarely do black turpentine beetle populations increase at rates high enough to be considered an outbreak.

Oak decline and oak wilt are two native tree diseases affecting the Forest. Oak decline is a complex, slow-acting disease syndrome involving the interaction of predisposing factors such as climatic trends, poor soil or site quality, tree age, or tree genetics; inciting factors such as short-term drought, frost, or insect defoliation; and contributing factors such as root disease, bark beetles, or canker or decay fungi (USDA).

Oak decline cannot be attributed to a single cause, and most reports mention one or more factors. In addition to drought or frost, combinations of the two-lined chestnut borer and Armillaria root disease are common factors (USDA). When mature oaks growing on average or poor sites experience drought or spring defoliation, they become weak and vulnerable to attack by secondary, opportunistic organisms.

Beginning in 2000 after extreme drought conditions, an oak decline related red oak borer epidemic began. The red oak borer (*Enaphalodes rufulus*) and white oak borer (*Goes tigrinus*) are native borer species that are typically found at healthy population levels within natural oak ecosystems. At healthy population levels, these borers rarely kill the tree they inhabit. However, in this instance, the availability of highly vulnerable oak stands in conjunction with record drought levels and excessive stand densities led to a borer epidemic. Two summers of average precipitation levels and subsequent increases in sap flow have shown a decline in oak borer population levels. However, the majority of the hardwood acres on the Forest remain vulnerable due to high stand density levels and older, more susceptible trees.

Oak wilt is a vascular wilt disease of oaks that currently is found only in North America. Oak wilt results when a fungus invades the vascular tissues of oaks, causing trees to wilt rapidly and die. A wide variety of oaks are susceptible, but species in the red oak group (northern red oak, scarlet oak, and black oak) are most readily killed. Oaks in the white oak group (white oak, post oak, and chestnut oak) are infected, but mortality occurs much less frequently and more slowly.

Dogwood is an important understory and midstory species in many forest communities and is valuable for fruit production, which benefits a wide variety of wildlife, and for their ornamental display of white “flowers” (technically bracts) and red berries (USDA). Dogwood anthracnose is a relatively new fungal disease of the native flowering dogwood. Both infection and spread of the disease are favored by moist, cool weather, which tends to occur at higher elevations, sheltered coves, and north-facing slopes. Shade increases the risk of infection and mortality due to slower drying conditions. Also, southern or western aspects tend to have less severe infection, possibly because of drier conditions and more sunlight. Detection surveys in Arkansas have not found anthracnose (USDA). Similarly, no reports are known for Oklahoma.

Since 1930, the American elm tree has been devastated by one of the most well-known diseases in the world, Dutch elm disease (USDA). The fungus that causes the disease is an exotic pest, introduced to America from Europe around 1930, but the native American elm bark beetle also spreads the fungus. In forests, elm losses have been spotty.

Chestnut blight fungus virtually destroyed the American chestnut as an overstory forest tree. The American chestnut does not occur in the Ozark-Ouachita Highlands, but chestnut blight also affects the Allegheny and Ozark chinquapins, which do occur on the Forest, and these species are related to American chestnut (USDA). The effects of the chestnut blight are similar in chinquapins, reducing infected individual trees to a clump of sprouts. More common within the Ozark-Ouachita Highlands Assessment area and more susceptible to the blight is the Ozark chinquapin. Ozark chinquapin is rarely used for wood products, but the nuts are valuable wildlife food and historically have been consumed by humans (Halls 1977b).

The Southern Region of the Forest Service has listed Ozark chinquapin as a Sensitive plant because of damage from the blight. The U.S. Fish and Wildlife Service considered placing it on the list of Threatened and Endangered plants, but has not listed it yet. Both the Arkansas Natural Heritage Commission and the Oklahoma Biological Survey maintain inventory records for this species.

The management guide proposed to fully protect Ozark chinquapins with stems 8 inches or greater in diameter at breast height (dbh). In addition, the guide allows impacts to smaller stump sprouts during normal forest management activities (e.g., prescribed fire or timber cutting). Although never officially adopted, the guide serves as a resource for management activities on the Forest at the District level.

Non-Native, Invasive Species

Animal and plant species not normally found in an area with an extraordinary capacity for multiplication and spread at the expense of native species are called non-native, invasive species. Because these species are introduced to areas where they are not native, they have few or no natural enemies, and they are able to reproduce and spread with little interference. Invasive species, particularly insects, pathogens, plants, and aquatic pests, pose a long-term risk to the health of the Nation's forests by interfering with natural and managed ecosystems, degrading wildlife habitat, reducing the sustainable production of natural resource-based goods and services, and increasing the susceptibility of ecosystems to other disturbances such as fire and flood (USDA Forest Service Strategic Plan for Fiscal Years 2004-2008).

A nonnative insect that poses a threat to forest health in many Eastern states is the European gypsy moth. These insects feed on numerous plants but prefer oak species. Gypsy moths spread when carried by wind or human activities. When gypsy moths reach the epidemic stage, they are capable of defoliating trees.

Another non-native species, the red imported fire ant, is omnivorous and preys on insects and small vertebrates (USDA). When foraging, they may gnaw holes in roots and buds, and in the spring, they seek sap from trees. More aggressive than native ants, fire ants have been implicated in declines of ground-nesting birds such as quail and turkey by attacking newly-hatched young. Other adverse effects are that fire ants may compete with native scavengers that feed on dead animals and fallen fruit, and disturbance of their mounds may cause mechanical problems for agricultural machinery (USDA). Currently, the fire ant population in Arkansas is moderate. It is probable that the ant will spread accidentally through transport by potted plants, trees, sod, and cattle, although fire ants are intolerant of cold temperatures.

Non-Native, Invasive Plants

In 2001, a Regional Forester's Invasive Exotic Plant Species List was developed. In 2004, the USDA Forest Service Southern Regional Strategy for Non-Native Invasive Species noted that a species is considered a "non-native invasive" if: it is not native (alien) to the ecosystem under consideration, and its introduction causes, or is likely to cause, harm to human health or economic or environmental harm. Many non-native invasive plants affect forest health, primarily by replacing native species and reducing native biodiversity. Appendix E includes species from the Regional Forester's Invasive Exotic Plant Species List that are known or are likely to occur on the Forest. As more data are collected, there is a potential for additional species to be added to the list. The Regional Forester's Invasive Exotic Plant Species List is divided into 2 categories.

Category 1 Species are non-native plant species that are known to be invasive and persistent throughout all or most of their range within the Southern Region. They can spread into and persist in native plant communities and displace native plant species; thereby posing a threat to the integrity of the natural plant communities in the Region. Use of Category 1 Species for re-vegetating or rehabilitating sites is prohibited on National Forest System land. Cooperators and partners may not establish or encourage Category 1 species for any reason in projects that receive Forest Service funding except as addressed by Memoranda of Understanding (MOU) and Memoranda of Agreement (MOA) that were already in effect on the date of issuance of the Regional Forester's

Invasive Exotic Plant Species List, or as required for scientific studies designed to further knowledge about invasive species. Efforts to control Category 1 species are encouraged where practicable. Proposals for non-native invasive plant species control will receive the highest funding priority when they include Category 1 species, particularly where native plant communities are threatened.

Category 2 Species are non-native plant species that are suspected to be invasive or are known to be invasive in limited areas of the Southern Region. Category 2 species will typically persist in the environment for long periods once established, and may become invasive under favorable conditions. Plant species in Category 2 pose a significant risk to the integrity of natural plant communities, and the establishment or encouragement of Category 2 species is prohibited in areas where ecological conditions would favor invasiveness and is discouraged elsewhere. Projects that use Category 2 species should document why no other (non-invasive, non-native, or native) species will serve the purpose and need. Cooperators and Partners are also discouraged from using Category 2 species. The Forest botanist, plant ecologist, or Forest noxious weed coordinator (or Regional specialists) should be consulted for alternative native or non-invasive non-native species that would serve the purpose and need of the project. Control efforts for Category 2 species may or may not be necessary to achieve the management objectives of the planning area.

Direct and Indirect Effects

Both native insects and diseases and non-native invasive species pose a long-term risk to the health of the Forest by interfering with natural and managed ecosystems, degrading wildlife habitat, reducing the sustainable production of natural resource-based goods and services, and increasing the susceptibility of ecosystems to other disturbances such as fire and flood. Under the right conditions, epidemic outbreaks may pose a serious threat to Forest resources and ecosystem health. Such threats are usually periodic, not constant (with the exception of invasive species), and are dependent upon a wide range of natural and man-made conditions.

Risk from native insects and diseases and non-native invasive species is a function of complex interactions of many factors, most that forest management cannot affect. Disturbances such as lightning, ice storms, tornadoes, wildfires, and droughts create conditions conducive to damage from insects, diseases and invasive species but are not within the control of management activities. Predisposing factors such as climatic trends, poor soil or site quality, tree age, vegetation density, tree genetics; inciting factors such as short-term drought, frost, fire or insect infestation; and contributing factors such as root disease, bark beetles or canker or decay fungi are all factors that may interact to create risk (USDA). Since many factors interact to create the risk condition, it is very difficult to predict effects of forest management. Factors directly attributable to man include mechanized logging that wounds trees, harvesting operations that compact soils and prescribed fires that lead to pine or hardwood mortality. The alternatives under consideration include measures that are useful in controlling the risk from such threats.

The Southern Research Station provided information on the acres at risk from southern pine beetle and acres at risk for oak decline. Table 3.60 displays the acres at risk from southern pine beetle and the acres at risk for oak decline by alternative in the first ten year period. As the threat from turpentine beetle is often linked with infestations of southern pine and Ips beetles, these three pests are considered together. In this comparison, Alternative E (because of focused treatments to maintain forest health in the Pine Oak Community) had the fewest acres, 63,000, at risk from SPB, while Alternative C with an aggressive forest health treatment strategy focused across all Communities has nearly as few acres; 66,000, at risk from SPB. Alternative C has, by far, the fewest acres, 7,000, at risk for oak decline when compared to the other alternatives; with Alternatives A, B, and D having the greatest number of acres at risk 91,000.

Table 3.60 Acres (x 1,000) at Risk for SPB and Oak Decline 1st 10 Year Period

Measure	Alternative				
	A	B	C	D	E
SPB Hazard	272	275	66	90	63
Oak Decline Risk	91	91	7	91	84

Age is a contributing factor to risk of disease infection or insect infestation. Older trees may have suffered damage from one or more sources, may be less vigorous, and do not tolerate stressors well. Seral stages (vertical structure) are surrogates for the age of the forest. Early seral describes the grass-forb/herbaceous condition, including the seedling and shrub condition, mid-seral describes sapling through poletimber conditions, and late seral describes immature and mature sawtimber conditions. Comparatively, Alternative B maintains the Forest in an older condition, and Alternatives C and D perform about the same in terms of forest age. Alternative C maintains the Forest in a condition that contains more acres in the early seral condition. Table 3.61 compares the alternatives by seral stages for Decade 1 and Decade 5.

Table 3.61 Seral Stages (acres x 1,000) by Decade, by Alternative

Seral Stage	Alternative									
	A		B		C		D		E	
	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year
Early Seral (0-20 age class)	205	338	238	354	319	556	283	445	279	388
Mid-Seral (poletimber)	657	364	573	230	584	220	637	314	564	239
Late Seral (immature and mature saw timber)	887	1,047	938	1,165	845	973	828	990	906	1,122

Treatments that are most beneficial to maintaining a healthy forest and reducing risk from insects and disease are thinning to reduce density which impairs the ability of the insects and/or diseases to spread; regeneration harvest to reduce stand age which increases vegetation vigor; uneven-aged management to reduce older, more vulnerable vegetation which induces regeneration; and prescribed fire to reduce stem density which maintains the Forest in a more open condition and maintains or enhances seed production in the nutrient rich grass/forb herbaceous vegetation layer.

Table 3.62 compares the alternatives by acres treated with prescribed fires (health prescription only), uneven-aged management, thinning, and even-aged regeneration.

Table 3.62 Treatments by Decade (Acres x 1,000) by Alternative

Treatment	A		B		C		D		E	
	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year
Prescribed Fire for Health ¹	504	504	312	312	795	795	415	415	425	425
Uneven Aged Harvest	250	250	110	110	100	100	200	200	125	125
Thinning	262	408	174	366	517	690	277	461	285	407
Even-Aged Regen Harvest	57	81	60	95	60	124	57	129	57	118
¹ Acres treated with the health prescription and does not include prescribed fire for fuel reduction or wildlife enhancement.										

It is possible to maintain the Forest in a reasonably healthy condition, although active management or control of insects, disease, and invasive species is impractical due to high costs on a forest-wide scale. When insects, disease or invasive species are detected, the Forest observes the progression and effects of the potential outbreak and may institute control measures. All alternatives include monitoring. Forest monitoring and a reactive strategy when risk factors indicate an impending episode of infection, infestation or invasion are sufficient to sustain the Forest. Occasional outbreaks, though not always predictable, are natural and will continue to occur under all alternatives.

There are few ways to reduce the impact of diseases. The following summary describes the most likely effects and outcomes of diseases identified as threats to Forest resources. Because of the lack of predictability and the complexity of interaction of naturally occurring factors, there are few activities with the potential to affect the spread or control of diseases. In comparing alternatives, there is little difference found among alternatives.

Oak Wilt: Because of the relatively low threat and high treatment costs, none of the alternatives include treatments for oak wilt.

Dogwood anthracnose: Treatment of dogwood anthracnose generally requires application of fungicides; however, such treatment is too expensive to be used in the Forest. Current research on prevention and treatment of dogwood anthracnose is focusing on genetic resistance. All alternatives would react to dogwood anthracnose in a similar manner.

Dutch elm disease: Elms will gradually become less frequent in the Forest, but extermination of the species is not likely. Active management or control of the disease is impractical; therefore, all alternatives should be considered equal in reacting to Dutch elm disease.

Chestnut blight fungus: Continued blighting and withering of sprouts will slowly reduce the prevalence of chinquapin and debilitate rootstocks. Extermination of the species is not likely.

The two non-native invasive species of insects identified as a threat to the Forest, gypsy moth and fire ant, are troublesome, but unless an epidemic of gypsy moth were to coincide with other infections or infestations, neither invasive species is considered a lethal threat to Forest resources.

As the range for European gypsy moth expands, the frequency of introduction of gypsy moth on the Forest will likely increase. Activities, including tourism and commerce, may transport both the moth and the fire ant into previously uninfected areas. Control of gypsy moth to protect oak species may lead to the use of insecticides to locally eradicate the moth and prevent it from becoming established on the Forest. It is expected that occasional outbreaks of both insects will occur on the Forest.

To protect native forest communities from the threat posed by non-native invasive plant species, the Southern Region adopted a policy that prohibits use of certain persistent and highly invasive species for revegetation or rehabilitation. Many variables influence the introduction and spread of non-native, invasive plant species—so many variables that it is very difficult to predict the effects of Forest management in controlling non-native, invasive species. Introduction may be natural or human-caused and may be intentional or non-intentional. Increases in the number of people visiting the National Forest and increases in the number of residences in proximity to the National Forest increase the chance of invasive species introductions; however, the probability of establishment for most of the currently recognized species is amplified when introduction coincides with disturbance that provides receptive conditions, such as bare soil and strong sunlight. Alternative C includes the most active management and most numerous ground disturbing activities. Therefore, it includes the most opportunity for introduction and consequent spread of non-native invasive species. This may be balanced by Alternative C projecting the most active program of prescribed fire, which is likely to hinder the spread of some invasive species.

Cumulative Effects

Long-term, despite the Forest's best control efforts, the number of invasive plant species can be expected to increase due to natural spread and inadvertent introduction by human causes such as ground disturbance or transport of goods.

Fire

A concern for forest health and its relationship to the risks of catastrophic fire has resulted in a number of government-wide initiatives, including the National Fire Plan (NFP), the Healthy Forest Initiative (HFI), and Healthy Forest Restoration Act (HFRA). These initiatives recognize the natural role of fire in ecosystems and the problems that decades of fire exclusion in these ecosystems have created as it relates to hazardous fuel build-ups and the risk of catastrophic fire. As a result of fire ecology research, ecosystems have been classified based on fire regime and condition classes (FRCC), and assessments of FRCC can help managers determine where fuels mitigation activities and ecosystem management work is most needed.

Wildland and Prescribed Fire

Fire Management on the Ouachita National Forest encompasses a wide variety of activities including wildfire prevention efforts, wildfire suppression, hazardous fuel reduction (prescribed fire and mechanical treatments), ecosystem management including restoration, maintenance and enhancement of fire-adapted ecological communities, firefighter training, community assistance in dealing with wildfires, and the dispatching of firefighting resources to both fire and non-fire (or "all-risk") incidents.

Prescribed Fire

The rationale for prescribed fire varies and can include ecological restoration, fuels management, silvicultural or wildlife habitat improvement, control of non-native invasive species, or other objectives. A prescribed fire often meets multiple objectives. Prescribed fires are also conducted on

the National Forest to help meet specific wildlife habitat objectives, to facilitate silvicultural operations, and to aid in the control of non-native, invasive species.

All prescribed fires require the completion and approval of a prescribed fire plan. These plans clearly state the objective(s) of the fire, document compliance with regional weather parameters and identify prescribed conditions needed to accomplish objectives (e.g. fuel moisture, wind direction, speed, relative humidity, mixing heights, transport winds, drought index). Screening is done to identify potential smoke sensitive targets up to 100 miles from planned fires. An emission model, fire behavior model, and smoke dispersion model are run prior to fire ignition to ensure compliance with state and federal standards and to predict fire intensity in response to specific burn objectives. A complexity analysis is done for fires where special integration/coordination is required. Specific mitigation (public notification, need for smoke warning signs, or other needed coordination) is documented. Weather is monitored periodically throughout the day of the burn. Other monitoring is conducted before, during, and after burns for implementation, effectiveness, and validation monitoring. Table 3.63 displays the five-year average of acres treated with prescribed fire 1999 – 2003.

Table 3.63 Prescribed Fire Statistics, 1993-2003

Ouachita National Forest Prescribed Fire Acres						
Fiscal Year	1999	2000	2001¹	2002	2003	5 Year Average
Acreage	106,110	99,931	52,342	80,285	128,319	93,397

¹ Acreage reflects effects of ice storm.

Current Conditions on the Forest in the Regional Assessment of Fire Regime and Condition Class (FRCC)

The Assessment was based on analysis of the Continuous Inventory of Stand Conditions (CISC) database as of FY 2000. Table 3.64 summarizes acres by Condition Class for the Ouachita National Forest.

Table 3.64 Fire Regime Condition Class

Condition Class	Acres
1	44,747.84
2	402,870.92
3	1,140,167.37
Acres Not Assigned ¹	192,315

¹ Acres not recorded in CISC or appropriate for FRCC (such as water).

Based on the Region 8 Mid-scale Assessment, a minimum of 1,140,167 acres of the Ouachita National Forest is in the worst possible of Condition Classes (Condition Class 3). Approximately 402,871 acres are in Condition Class 2, and only about 44,748 acres are estimated to be in Condition Class 1.

Direct and Indirect Effects

While suppression strategies and resources needed to combat wildland fires will not vary by alternative, the level of prescribed fire for hazardous fuel mitigation and ecosystem management will vary.

Alternative C, because of the projected level of prescribed fires (250,000 acres annually), will provide the highest level of hazardous fuels reduction and ecological restoration and maintenance in fire-adapted ecosystems. A variety of other vegetation management tools (mechanical, herbicide, etc.) will likely also be used to restore rare ecological communities that are fire-dependent (e.g, glades and prairies). As needed, fire will be used to help control non-native, invasive vegetation whenever and wherever it is practical to do so.

Alternative E, at an average annual prescribed fire program of 180,000 acres, will likewise contribute significantly to fuels mitigation and ecological restoration, but will likely relegate some restoration of rare ecological communities and control of non-native invasive plant species to occurrences embedded in larger landscape burns.

The level of prescribed fire in Alternative B will be similar to that which has occurred over the last 5-10 years, about 100,000 to 125,000 acres annually. Priorities will be established based on the need for burning for Threatened and Endangered Species habitat areas (Red-cockaded Woodpecker, primarily), burning around communities at risk, and in the wildland urban interface and additional emphasis in fire-adapted old growth communities.

Alternative A projects about 68,000 acres, and Alternative D projects 100,000 acres of average annual prescribed fire. This level of burning will be needed to lower Condition Class in the wildland-urban interface/intermix (WUI) and to maintain minimum levels of critical habitat for RCW. Either of these alternatives can change or reverse viability trends for a number of flora and fauna, and hamper any effort to maintain fire-adapted old growth. Only 10 to 20 percent (roughly 250,000 acres) of the landscape will likely become, and be maintained, as Condition Class 1. Table 3.65 presents, by alternative, acres projected to be in fire regime condition classes 1–3.

Table 3.65 Fire Regime Condition Class (FRCC)

	Alternative				
	A	B	C	D	E
FRCC 1	265,834	84,402	356,480	140,101	291,555
FRCC 2	0	37,124	178,487	142,407	5,306
FRFC 3	1,464,656	1,608,964	1,195,523	1,447,982	1,433,628

Cumulative Effects

As more acres are restored to condition class 1 in ecological communities adapted to low-intensity periodic fire (Fire Regime 1), the woodland condition would prevail over a larger part of the landscape. In this condition, surface fuels are the primary component contributing to fire behavior. This would represent a change in current fuel profiles where surface fuels, aerial and ladder fuels can all contribute to fire behavior. The woodland types would include a more “grassy” fuel component (Fuel Model 2) as compared to the closed canopy forest fuel type (Fuel Model 9). In the woodland condition, total fuel loading would be less than in the forest condition (as much as half the current average fuel loading in tons per acre). There would not be as much of a woody live and/or dead fuels component to contribute to either flaming or smoldering fire behavior. In prescribed fires and wildfires, the grassy component would burn more easily, faster, and produce fewer smoke emissions (both in concentration and duration) as compared to current fuel conditions. Fire intensity would be less in the woodland condition and there would be less likelihood (risk) of stand-replacement burns. Suppression efforts would be less costly while providing a higher degree of safety to both the public and firefighters. Although the role of fire in fire-adapted ecosystems has been studied in recent years, it is not possible to precisely know the exact role that fire has played over time. Also, the role of fire may appear different depending on which years or time periods are

compared. Given these uncertainties, the cumulative effect of prescribed fire will likely not restore the role of fire to the level it would have been in all fire-adapted ecosystems. None of the alternatives is likely to lead to much more than half of the fire-adapted ecosystems being restored to their natural mean fire interval. Of the alternatives being considered, Alternatives C and E place the most emphasis on ecological restoration and maintenance, while Alternatives A and D place the least emphasis in ecosystem management. Alternative B is intermediate by comparison.

Wildland Fire Suppression

Each year, Arkansas and Oklahoma experience hundreds of wildfires. Many of these fires threaten rural homes and other structures. Federal, state, and local rural fire departments are primarily responsible for controlling these wildfires.

Firefighting forces suppress most wildfires in the Forest while they are small. These fires often occur at times of the year and under conditions so that fire intensities are low or moderate resulting in little damage. Without prompt suppression, many of these fires would grow in size and eventually threaten homes and property. Some fires occur on “high fire danger” days, where low relative humidity and wind result in larger, more potentially destructive wildfires. These are most often springtime events. When summer and fall droughts occur, wildfires in Arkansas and Oklahoma can be very destructive, though infrequent. Table 3.66 displays fire occurrence statistics for the years 1980 – 2003.

Table 3.66 Ouachita Fire Occurrence Statistics by Calendar Year 1980 – 2003

	1980-1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
Lightning	296	11	19	8	25	20	22	31	8	15	455
Equipment	55	6	4	2	7	5	13	3	5	4	104
Smoking	80	5	2	2	1	1	2	0	1	0	94
Campfire	55	3	2	4	5	6	1	3	3	4	86
Burning Debris	135	14	21	4	7	17	13	5	3	9	228
Rail Road	22	7	4	17	7	4	9	2	1	2	75
Arson	1,029	86	123	49	51	57	96	37	37	48	1,613
Children	7	1	0	0	1	0	1	0	0	0	10
Miscellaneous	188	11	11	8	10	14	12	12	9	12	287
Total # Fires	1,867	144	186	94	114	124	169	93	67	93	2,951
Total Acres	25,596	3,279	2,363	1,066	3,543	2,153	1,928	1,173	1,231	3,276	45,608

During the period from 1980 to 2003, about 15 percent of the wildfires on the Ouachita National Forest were lightning-caused, while 75 percent were human caused. Of the human caused fires, 55 percent were arson.

Wildland Fire Suppression – Fire Management Plan

The Fire Management Plan (FMP) documents program elements and direction in wildland fire suppression and management. It serves as a “desk guide” for implementing the fire management

program as discussed in the Forest Plan resource objectives. This document identifies the objectives and constraints that regulate wildland fire suppression and use across the Forest.

A full range of suppression strategies may be utilized. Direct attack is most often the costliest, and is used whenever safety is a concern or to minimize acreage burned and resource values lost. Indirect attack often allows the fire to become larger by allowing it to spread out to pre-existing barriers in exchange for lesser costs. The option of simply monitoring the fire, both its behavior and effects, may be the most cost efficient strategy in those areas where the effects of the fire are desirable and the risk to safety or resource values is manageable. Firefighter and public safety is always the primary consideration for all suppression actions. Strategies and tactics for the fire should secondarily be commensurate with resource values at risk.

Direct and Indirect Effects

While the firefighting resources would remain stable regardless of alternative, the effects of wildfire (wildfire intensity, duration, and resistance to control) would change over time based on alternative. Alternatives C and E would lead to conditions with lower fuel loading occurring on a significant portion of the forested landscape. All WUI areas would be maintained as Condition Class 1. Snags would likely be less of a problem in treated stands and firefighter safety would be better addressed. Fire suppression costs would likely go down in Alternatives C and E over time as fire fuels are reduced. Alternative B would be intermediate in response to fuels mitigation and firefighter/public safety by comparison. Alternatives A and D would provide the least responsiveness to these concerns (fuels mitigation, suppression costs, and firefighter and public safety).

Cumulative Effects

The effects of prescribed fires are usually short-lived and cumulative impacts are generally ascribed to benefits to soil and potential for smoke accumulation. The impacts of prescribed fire on soils are expected to stay within established limits for all alternatives. Due to the proximity of the Ouachita National Forest with the Ozark-St. Francis National Forests, which also have burn programs, there is potential, depending on wind speed and direction, for cumulative effects from smoke produced from the prescribed fires to accumulate in areas more than if just one Forest was implementing a burn program. See the Air Quality effects section for additional information.

Wildland Urban Interface/Intermix

As the populations increase and private lands within the forest boundaries become populated with single structures, small farms, poultry operations, and other developments, the wildland-urban interface/intermix (WUI) is becoming more of an issue. Many rural residents typically like to live in wooded surroundings and desire to maintain a natural vegetative setting around structures, which blends property into the adjacent forested environment. While being aesthetically pleasing, an unmanaged forest setting on private land or on federal land adjacent to private structures can become a hazardous fuel issue in the event of a wildfire. Nationally, the direction is to increase hazardous fuel treatment either with prescribed fire or mechanical treatments in WUI areas. These areas pose the greatest threat to public and firefighter safety as well as being the most complex and expensive areas to suppress wildland fires. A variety of methodologies were assessed to provide an estimate of WUI on the Forest.

Communities at Risk

State and federal land managers for the states of Arkansas and Oklahoma developed a list of communities at risk. This list was published in the Federal Register (Federal Register 66:751, 2001); over 500 communities were listed. A GIS analysis was used to help identify how many

communities are at risk. Such communities within one-half mile of National Forest System land are listed in Table 3.67.

Table 3.67 Communities at Risk on or Near the Ouachita National Forest

Arkansas	Oklahoma
Alamo	Big Cedar
Avant	Black Fork
Big Fork	Haw Creek
Bonnerdale	Lenox
Cedar Creek	Page
Harvey	Pleasant Hill
Mountain Pine	Stapp/Zoe
Norman	Tom
Oden	
Onyx	
Sims	
Story	
Waltreak	

Of the communities at risk near the Ouachita National Forest, there are about 2,583 acres of federal land within the half-mile boundary. The breakdown of Condition Class on federal land in relation to communities at risk is shown in Table 3.68.

Table 3.68 Acreage by Condition Class of Land within 0.5 Mile of Communities at Risk

Category	Acres
Condition Class 3	2,043
Condition Class 2	511
Condition Class 1	29
Private Land	11,723
Total Acres in 0.5 mile radius	14,306

In addition to the lands in Table 3.68, there are approximately 80,393 acres of private and National Forest System lands in the wildland urban interface/intermix, as determined via a Geographic Information System analysis of a study conducted by the University of Wisconsin found online at http://silvis.forest.wisc.edu/projects/WUI_Main.asp.

Direct and Indirect Effects

All the alternatives focus attention on fuels mitigation projects in the WUI and near communities at risk. All the alternatives call for enough prescribed fire to accomplish the task of lowering Condition Class in the immediate vicinity of these areas. Alternatives calling for 125,000 acres or more of prescribed fire (Alternatives B, C, and E) provide the best potential benefit of treating even larger landscapes intersecting the WUI and treating fuels surrounding communities at risk.

Cumulative Effects

Over time, fuels reduction due to prescribed fire will reduce the fire hazard in the WUI leading to less damage to private properties than fires with heavy fuel loads. Also, reduction in fuels will, over time, benefit fire control by reducing resistance to control. Overall, risk to communities should be significantly reduced as a result of fuel reduction in the WUI.

Socio-Economic

Social and Economic Environment (Local Community Effects)

Social analysis coupled with economic and demographic information forms the human dimension of ecosystem management. This section characterizes demographic (social) changes; economy trends; values, attitudes, and beliefs; effects of national forest management on the local economy; and the efficiency of national forest programs to the tax paying public.

Social attitudes, values, and beliefs are elements used to describe and understand the human dimensions of resource management. This information is used to predict possible effects on local communities. These effects may include acceptance of or resistance to the decisions made. This information is used with the biological and physical analysis to best understand potential effects on the land as well as the human environment.

Demographic Changes

One characteristic of an area used to determine how dynamic and subject to change it may be is the growth of population and its various racial and ethnic components within the counties that comprise a national forest. A static population would imply few possible issues affecting change. Conversely, a dynamic, growing population may produce many conflicting issues for land managers to consider. Certain areas of the Forest and surrounding lands that are attractive to urban dwellers for recreation, second homes, or retirement may have the greatest potential for generating conflicts with traditional residents of the area dependent upon the resources of the Forest for their livelihoods and with national forest management.

Demographic changes are given for the Forest; then a contrast is made with the states in which the Forest exists (Arkansas and Oklahoma). When data are available, contrasting data are usually made for the Census decades of 1980, 1990, and 2000. Other data from non-Census sources may present years that differ from these decadal periods. Tables in Appendix B present all counties within the Forest proclamation boundaries. At times, the narrative will point out unusual characteristics of individual counties; the reader will be referred to the Appendix B for further contrasts with the remaining Forest counties.

Appendix B, Table B.13 shows total population and rates of change for each county within the Forest proclamation boundary. Saline County showed the most growth, with over 20 and 30 percent growth for the 1980 and 1990 decades, respectively. Several counties showed negative growth during the 1980s, but most counties in the Forest area showed strong growth during the 1990s. Total percent growth of the Forest counties exceeded the percent growth of Arkansas as a whole. Thus, little growth was evident in both the Forest and the states during the 1980s, but growth picked up substantially in the 1990s for all three.

Appendix B, Table B.14 contains population characteristics (especially minority) for all counties. Population increased by 4.0 percent from 1980 to 1990 in Forest boundary counties, compared with 2.8 percent for Arkansas and 4.0 percent for Oklahoma. More currently, the change from 1990 to 2000 was 13.7 percent for Arkansas, 9.7 percent for Oklahoma, and 15.8 percent for the Forest area. Meanwhile, minority share of the population was 17.3 percent for Arkansas, 14.1 percent for Oklahoma, and 9.5 percent for the Forest area for 1980, and 20.0 percent for Arkansas, 27.2 percent for Oklahoma, and 14.0 percent for the Forest area for 2000. In Oklahoma, Howard, LeFlore, and McCurtain Counties had over 20 percent shares of their population represented by minorities (see Appendix B, Table B.14). All areas have increased their share of minority residents over the last 20 years.

Table 3.69 illustrates significant population variable changes from 1980 to 1990 and 1990 to 2000 on all counties within the Forest boundary.

Table 3.69 Minority Population

	1980 Minority	1990 Minority	2000 Minority	Pop. Change '80-'90	Pop. Change '90-'00
Forest Counties	9.5%	10.6%	14.0%	4.0%	15.8%
Arkansas	17.3%	17.3%	20.0%	2.8%	13.7%
Oklahoma	14.1%	18.5%	27.2%	4.0%	9.7%

Source: U.S. Census Bureau from USDA NRIS HD Model

Table 3.70 displays population density for Forest boundary counties and for the States of Arkansas and Oklahoma.

Table 3.70 Population Density (Persons per Square Mile)

	1990	2000
Forest Boundary Counties	80.3	96.9
Arkansas	45.1	51.3
Oklahoma	45.8	50.3

Source: U.S. Census Bureau from USDA NRIS HD Model

Population density was 45.1 people per square mile in Arkansas in 1990, while the population density for the Forest was almost twice this rate, 80.3 people per square mile. Population density in 2000 increased marginally to 51.3 persons per square mile in the state, a 14 percent increase, while the Forest counties increased to 96.9—a 21 percent increase. Population density is especially high in Sebastian County (214.6 persons/square mile) and Saline County (115.5 persons/square mile) in 2000. Other counties within the Forest boundaries had densities below 50 in 2000 (see Appendix B, Table B.15).

The significance of these population changes is that the Forest boundary population grew at a faster rate for the 1980 to 1990 decade and for the 1990 to 2000 decade than that of Arkansas. Oklahoma grew at a similar rate to that of the Forest in the 1980's decade, but slower in the 1990's decade.

Minority population share of the total still lags behind that of the States of Arkansas and Oklahoma. This is to be expected because of the larger urban populations found elsewhere in the States. Minority population grew at a 76 percent rate compared to a 35 percent rate for Arkansas and a 92 percent rate for Oklahoma from 1980 to 2000.

The rural nature of the area is contrasted with the states in Table 3.71. For a breakout of all counties within the Forest boundaries, see Appendix B, Table B.16.

Table 3.71 Percentage of Population in Rural Areas

	1980	1990	2000
Forest Boundary Counties	52.7	51.7	52.5
Arkansas	48.4	46.5	47.6
Oklahoma	32.7	32.3	34.7

Source: U.S. Census Bureau from USDA NRIS HD Model

Although there was loss of rural share in the Forest area during the 1980's, the rural characteristic of the Forest analysis area has changed only slightly in the 1980-2000 period. The percentage of persons living in rural areas for the aggregated counties making up this area decreased slightly from 52.7 percent in 1980 to 52.5 percent in 2000. This compares with the less rural character of Arkansas, which decreased from 48.4 to 47.6 and Oklahoma, which increased from 32.7 to 34.7 percent from 1980 to 2000.

Appendix B, Table B.18 indicates that Montgomery, Perry, and Pike Counties in Arkansas were 100 percent rural in 2000. All Arkansas counties except Garland and Saline became slightly more rural from 1980 to 2000. In Oklahoma, LeFlore and McCurtain Counties both became more rural from 1980 to 2000. LeFlore increased from 62 percent in 1980 to 69 percent in 2000.

There appears to be a significant rise in population growth in the Forest analysis area in the 1990 decade—a characteristic that was absent during the 1980s. This rural characteristic of the area, however, remained about the same from 1980-2000.

Per capita income is a relative measure of the wealth of an area. It constitutes the personal income from all sources divided by the population of that area. For the Forest analysis area, the per capita income average was \$9,647 and \$15,737 in 1990 and 2000, respectively. Per capita income for Arkansas was \$10,520 and \$16,904 in 1990 and 2000, respectively. Per capita income for Oklahoma was \$11,893 and \$17,646 in 1990 and 2000, respectively. These statistics are presented in Table 3.72. Per capita income is slightly more than \$1,000 less in the Forest area than in Arkansas and slightly less than \$2,000 in Oklahoma when 1990 dollars are adjusted to 2000 dollars (see Appendix B, Table B.19).

Table 3.72 Per Capita Income

	1990	1990 Adjusted to 2000 \$'s	2000	Real Avg. Annual Change*
Forest Boundary Counties	\$9,647	\$12,559	\$15,737	2.3
Arkansas	\$10,520	\$13,886	\$16,904	2.0
Oklahoma	\$11,893	\$15,699	\$17,646	1.2

Source: U.S. Census Bureau from USDA NRIS HD Model

*Real rates of increase were determined by inflating 1990 housing prices to 2000 with the Consumer Price Index Deflator

The real average change in Forest area income between 1990 and 2000 was 2.3 percent per year, which contrasts with that of 2.0 percent per year for Arkansas and 1.2 percent per year for Oklahoma. Perry County was the fastest growing county for per capita income (3.3 percent per year on a real basis) over the 1990 decade.

Income for the Forest area grew faster than income for Arkansas and Oklahoma on a real basis (inflation adjusted) during the 1990's. Thus, the financial well being of the population increased at a greater rate in the Forest area than that of Arkansas and Oklahoma for the 1990's decade.

Another indicator of relative economic prosperity is the percent of the workforce out of work. Unemployment rates change dramatically over time, depending in large part on the national economy. Some areas have protracted unemployment problems because of low educational attainment and lack of skills.

In 2001, the Forest had a similar unemployment rate (5.2 percent) to that of Arkansas, but the rate was much higher than the rate for Oklahoma (3.8 percent) as shown in Table 3.73. The Forest unemployment rate was calculated as a weighted average (unemployment rate and number of unemployed) of all counties in the area (see Appendix B, Table B.20).

Table 3.73 Unemployment Rate (Percent)

	1995	1998	2001
Forest Boundary Counties	5.5	5.9	5.1
Arkansas	4.9	5.5	5.1
Oklahoma	4.7	4.5	3.8

Source: U.S. Bureau of Labor Statistics from USDA NRIS HD Model

During the period of 1995 to 2001 the unemployment rate for the Forest area decreased by 0.4 percent. The rate for Arkansas increased marginally by 0.2 percent and the rate for Oklahoma decreased by almost one percentage point. Ashley, Hot Spring, and Perry Counties in Arkansas, and McCurtain County in Oklahoma had unemployment rates that were significantly higher than the Forest average for 2001. Unemployment on average in the analysis area was about on par with that of Arkansas but much higher than Oklahoma in 2001.

Poverty is represented in Table 3.74 (more specific Forest information can be identified in Appendix B, Table B.21):

Table 3.74 Poverty Rate (percent)

	1980	1990	2000
Forest Boundary Counties	17.0	17.5	14.8
Arkansas	19.0	19.0	16.0
Oklahoma	13.4	16.7	14.7

Source: U.S. Census Bureau from USDA NRIS HD Model

Five counties in the Forest area had poverty rates in 2000 greater than the weighted average for the analysis area. McCurtain County, Oklahoma, had a 2000 poverty rate of 24.7 percent, the highest of all counties in the Forest area. At 7.2 percent, Saline County had the lowest poverty rate in 2000. Generally, all counties experienced declining poverty rates from 1980. Only Sebastian and McCurtain Counties had slight increases over this time. The average was lower for the Forest (14.8 percent) than Arkansas (16.0 percent). Since 1980, the poverty rate has declined by 2.2 percent for the Forest area, 3 percent for Arkansas, but it has increased by 1.3 percent in Oklahoma.

Transfer payments from the federal government to the states and their citizens are another indicator of relative poverty in an area. Transfer payments are payments to persons for which they do not render services in the current period. As a component of personal income, they are payments by

government and business to individuals and nonprofit institutions. Although most of transfer payments are made in cash, they also include Medicare, Medicaid, and food stamps. At the state level, approximately 90 percent of total transfer payments are estimated on the basis of directly reported data. The remaining 10 percent are estimated on the basis of indirect, but generally reliable, data.

Table 3.75 illustrates the analysis area average versus the state receipts of these payments from the federal government. The growth rate in federal transfer payments for the Forest analysis area is similar to that of Arkansas, but faster than the growth rate for Oklahoma from 1970 to 2000. Appendix B indicates that Saline County had a 7 percent growth rate of payments over this period. For McCurtain and LeFlore Counties, OK, payments grew only 2.4 percent and 3.1 percent per year, respectively.

Table 3.75 Federal Transfer Payments to Individuals

	1970 (000 \$'s)	1990 (000 \$'s)	2000 (000 \$'s)	Real Rate of Avg. Annual Change '70-'00*
Forest Boundary Counties	\$641,877	\$1,616,605	\$2,220,034	4.2%
Arkansas	\$3,022,006	\$7,598,406	\$10,382,800	4.2 %
Oklahoma	\$4,356,595	\$9,399,962	\$12,770,090	3.6 %

Source: U.S. Bureau of Economic Analysis

*Real rates of increase were determined by inflating 1970 dollars to 2000 with the Consumer Price Index Deflator

Another factor indicating relative poverty and social disparity for an area is the percent of households headed by a female member. The greater this percentage is, the more likely that these households may be on some form of government assistance. Table 3.76 contrasts the experience for the two areas of comparison:

Table 3.76 Female Head of Households

	1990 Female Head of Households (percent)	2000 Female Head of Households (percent)
Forest Boundary Counties	5.5	6.4
Arkansas	6.3	7.4
Oklahoma	6.1	7.0

Source: U.S. Census Bureau from USDA NRIS HD Model

For 1990 and 2000, female-headed households were slightly less in the Forest analysis area than for Arkansas and for Oklahoma. A lower percentage of female-headed household for the Forest may indicate greater social cohesion from the extended family. For the Forest, from 1990 the share of female-headed households with children present has increased by almost one percent. This may be indicative of a higher divorce rate in the 1990s than before.

A few counties such as Ashley, Howard, and McCurtain had female household percentages larger than that of the state of Oklahoma and Arkansas in 2000. These same counties plus LeFlore, Oklahoma had household sizes larger than that of both states in 1990 (see Appendix B, Table B.26). This may indicate less social cohesion and more economic adversity than counties with much lower percentages.

The number of persons per household also indicates economic status in a region. The greater the average number of persons per household, the less prosperous an area tends to be. Density of households is shown in Table 3.77. More specific information about individual Forest county information on households can be found in Appendix B.

Table 3.77 Density of Households

	1990 Persons Per Household	2000 Persons Per Household
Forest Boundary Counties	2.7	2.5
Arkansas	2.6	2.5
Oklahoma	2.6	2.5

Source: U.S. Census Bureau from USDA NRIS HD Model

The change in household size from 1990 to 2000 decreased slightly for the Forest and both states. Most of the counties in the Forest analysis area had household sizes that approximated the average for the Forest and the state. Very large households do not seem to be a characteristic of the Forest analysis area.

Table 3.78 shows that the decade of the 1990s appears to be a decade of moderate growth. Housing unit growth from 1990 to 2000 was 17.7 percent for the Forest area, while Arkansas showed a similar growth rate of 17.2 percent. Oklahoma's growth was less than half of Arkansas' and the Forest's. Such a contrast is explained by the slower population growth in this decade than either Arkansas or the Forest. Housing unit growth in Saline County showed the greatest growth (37.5 percent) of the analysis area counties. Ashley and Scott Counties showed the least growth, with 8.1 and 9.8 percent, respectively (see Appendix B, Table B.27).

Housing vacancy rates have decreased marginally in the last 10 years. The Forest analysis area had rates about one and one-half percent more than that of Arkansas in 1990. In 2000, the rate differential between the Forest and Arkansas was only 0.6 percent. Meanwhile, Oklahoma's vacancies decreased from 14 to 11 percent from 1990 to 2000. Thus, housing over-supply has diminished in all three areas. For 2000, housing vacancy was especially high in Garland, Montgomery, and Pike Counties, with rates of 16, 25, and 19 percent, respectively. All of these counties except Pike had rates in 2000 that were lower rates than 1990 (see Appendix B, Table B.27).

Table 3.78 Housing Units

	Housing Unit Percent Change 1990-2000	Percent Vacant Units 1990	Percent Vacant Units 2000
Forest Boundary Counties	17.7	12.4	11.7
Arkansas	17.2	10.9	11.1
Oklahoma	7.7	14.0	11.0

Source: U.S. Census Bureau from USDA NRIS HD Model

Median housing value is contrasted in Table 3.79. Housing values within the Ouachita analysis area tend to be substantially below that of Arkansas and Oklahoma. Housing values are determined principally by the extent of demand. Higher prices are a result of greater demand. Population and job increases play a factor in the extent of demand for housing. Population has only begun to increase at a significant rate in the 1990s. The prior decade population grew at a small pace. Housing stock increased at a significant rate in the decade of the 1990's. However, value is still low

compared with both states which have the influence of urban areas and can support higher priced housing. At any rate, it appears that the Ouachita analysis area is fairly dynamic as far as new home additions, slightly exceeding the growth rate of the States. Population and wage and salary growth will have to increase significantly to warrant significant increases in housing values.

Table 3.79 Housing Value

	1990 Median Value	2000 Median Value	Real Avg. Rate of Change 1990 - 2000*
Forest Boundary Counties	\$38,440	\$60,360	1.75%
Arkansas	\$46,000	\$72,800	1.83 %
Oklahoma	\$47,600	\$70,700	1.19%

Source: U.S. Census Bureau from USDA NRIS HD Model

*Real rates of increase were determined by inflating 1990 housing prices to 2000 with the Consumer Price Index Deflator

Appendix B, Table B.28 shows the median housing values of all counties in the Forest analysis area. Forest boundary counties housing values are significantly below those of both states. However, Garland, Saline, and Sebastian Counties have median values that significantly exceed those of the analysis area and the states.

Trends in the Economy

Analyzing the major sectors of an economy allows insight into how diverse it is and what industries may be driving its growth. Appendix B shows the entire economy broken out by important industry sub-sectors for wood products. There is also an estimate of wild land recreation developed in a Forest Service publication (Technical Advice Bulletin TAB-05032004) that provides an estimate of labor income from recreation activities for both federal and non-federal sources in each county.

Table 3.80 shows the Manufacturing sector, the sub-sectors for wood based industries, and an estimate of the wild land recreation for a percentage share of labor income for 1990 and 2000. Employment share is given for all categories except wildland recreation. Recreation is not a sector of an economy but comprises several of the services and retail industries.

Table 3.80 Economic Diversity

Sub-Sector	1990 Employment % of Total Economy	2000 Employment % of Total Economy	% Average Annual Change '90-'00	1990 Labor Income % of Total Economy	2000 Labor Income % of Total Economy	% Real Average Annual Change '90-'00
Manufacturing	23.9	21.1	1.1	31.1	26.9	1.1
Lumber & Wood Products	3.5	3.1	1.2	4.4	4.0	1.6
Wood Furn. & Fixtures	1.1	0.9	0.0	1.0	0.9	0.0
Paper & Pulp Products	2.0	1.3	-1.7	4.4	3.0	-1.2
Total Wood Products	6.6	5.3	0.3	9.8	7.9	0.4
Wild land Rec.	NA	NA	NA	2.5	2.0	-2.1
Total Economy*	\$223,037	\$282,909	2.4	\$5,696.7	\$7,325.9	2.5

Source: IMPLAN 1990 and 2000 Data

*Real rates of change were determined by inflating 1990 to 2000 with the Gross National Product Price Index Deflator

It is evident that the Forest area economy is becoming slightly less reliant on the manufacturing sector (it is becoming more diverse). Its importance declined by more than 4 percent of the share of labor income from 1990 to 2000. Still, manufacturing is a relatively large proportion of the local economy's labor income, representing almost 27 percent of the economy in 2000.

Of the wood manufacturing sector, total wood products maintain a 7.9 percent share of the local economy's labor income in 2000. This is a relatively large decrease from the 9.8 percent share it had in 1990. Employment's share diminished from a 6.6 percent share in 1990 to 5.3 percent share in 2000.

Wild land recreation, which includes federal and state recreation areas, decreased in share from 1990 by 0.5 percent share to 2.0 percent of the local economy, as measured by labor income. There are no estimates of employment for recreation.

Tables B.29 – B.38 in Appendix B compare the Forest analysis area's economy for 1990 and 2000 for all nine major sectors of the economy.

The overall composition of the analysis area economy has not changed greatly from 1990. The only sector besides manufacturing that has changed significantly is Services, which increased from 21.6 to 25.1 percent in 2000 as measured by employment change. Other sectors changed less than one percent. The entire economy's labor income grew at an average annual rate of 2.5 percent over the 1990 decade (based in constant 2000 dollars).

The estimate for wild land recreation's labor income decreased from 2.5 in 1990 to a 2.0 percent share of the 2000 economy, indicating the overall economy has grown faster than recreation activity. Thus, the local economy has changed little in the last 10 years. The economy's main drivers are Manufacturing and Services. Table 3.81 shows the average annual growth rate in employment and labor income over the 1990s.

Table 3.81 Economy Dynamics

	Employment Average Annual Change 1990-2000	Labor Income Average Annual Change 1990-2000
Forest Boundary Counties	2.4 percent	2.5 percent

Source: IMPLAN 1990 and 2000 Data

Both employment and constant 2000 dollar labor income have grown at nearly the same average annual rate (2.4 percent versus 2.5 percent, respectively).

Another way to indicate diversity of an economy is with the Shannon-Weaver Entropy Indexes of diversity. This process generates a relative measure of how diverse a county is with a single number. The entropy method measures diversity of a region against a uniform distribution of employment, where the norm is equi-proportional employment in all industries. All indices range between 0 (no diversity) and 1.0 (perfect diversity). These two extremes would occur when there is only one industry in the economy (no diversity) and when all industries contribute equally to the region's employment (perfect diversity). In most cases, diversity would be registered somewhere between 0 and 1.0. Another factor affecting the magnitude of the index is the number of industries in a local economy; the greater the number, the larger the index.

Table 3.82 contrasts the change in diversity from 1990 to 2000 at the four digit SIC or individual industry level. For a point of reference, Arkansas serves as comparison. Appendix B, Table B.38 illustrates the indexes for all counties in the Ouachita analysis area.

Table 3.82 Shannon-Weaver Entropy Indexes

	1990 Index	2000 Index	Percent Change
Forest Boundary Counties*	0.63224	0.64220	1.6
Arkansas	0.74039	0.73581	-0.6
Oklahoma	0.70993	0.71233	0.3

*Weighted Average Estimate of Aggregated Counties. Weighted by full-time and part-time employment in their respective years.

Source: USDA Forest Service, Information Monitoring Institute

The indexes measuring diversity show a slight increase in diversity in the Forest analysis area between 1990 and 2000, a slight decrease in Arkansas, and a slight increase in Oklahoma. The Forest area became 1.6 percent more diverse while Arkansas became 0.6 percent less diverse. Oklahoma percent gain in diversity was 0.3 percent over the 1990s. Yell County had the greatest increase in diversity during 1990s, about a 9 percent change. Meanwhile, Logan County, at minus 1.6 percent, had the greatest decrease during the decade.

As indicated by the analysis above of the Ouachita economy, the overall change over the 1990 decade was marginal. This is substantiated by these diversity indexes, which changed very little.

A principle way an economy grows is by export of goods and services. Most typically, manufacturing activity is thought of as providing most of this export related activity. However, services and retail trade can be considered "export" industries if significant visitors come in from outside in travel related activities to bring in new dollars. A manufacturing industry can be a net importer if it imports more of a commodity that it exports.

Table 3.83 compares the exporting characteristics of the Forest's analysis area for 1990 and 2000.

Table 3.83 Exports by Selected Industries

	1990 Net Exports*	2000 Net Exports
Lumber & Wood Products	\$462	\$763
Wood Furniture & Fixtures	\$90	\$112
Paper & Pulp Products	\$727	\$772
Total Manufacturing	\$1,391	\$1,962
Total of All Sectors	-\$227	-\$3,188

*1990 Dollars Converted to 2000 Dollars via GDP Price Deflator

Source: IMPLAN 1990 and 2000 Data in millions of dollars

The chart shows that this Forest's local economy went from a net importing economy in 1990 to an even greater net importing economy in 2000. The 1990 decade saw the total economy's reliance on imports increase by 14 fold over 1990, thereby becoming more reliant on other areas for its goods and services production. Wood Products, meanwhile, showed large changes in the three wood products sectors whereby those industries actually gained in their net exporting status. Total manufacturing also gained in net exporting by 41 percent in the 1990 decade. Wholesale and Retail Trade; Finance, Insurance, and Real Estate; and Services were sectors that showed the greatest change in net imports over the 1990 decade. The only positive exporting sectors were Manufacturing and Construction (see Appendix B, Table B.40).

In summary, the Forest area economy is less diverse than the regional Arkansas and Oklahoma economies. Both states and the Forest analysis area became slightly more diversified over the 1990 decade. Most of the individual counties in the analysis area showed small increases over the decade as indicated by the Shannon-Weaver indices.

Annual Payments to Counties with National Forest System (National Forest System) Lands

Under the Secure Rural Schools and Community Self-Determination Act of 2000 (Public Law 106-393), counties with National Forest System lands periodically elect one of the following options for annual payments from the U.S. Treasury (compensating them for the absence of property taxes on these lands):

- An annual “25-percent payment”
- A “full payment amount”

The traditional 25-percent annual payment is based on the gross revenues from timber sales and other revenue-generating activities on a national forest in a given fiscal year. Under this method, payments to states vary from year to year according to the actual revenues generated. States then apportion these payments among counties based on their national forest acreage. Among Ouachita National Forest counties, Ashley, Hot Spring, Howard, and Pike Counties (all in Arkansas) elected 25-percent payments and, under the current law, will remain under that payment system until at least October 2006. (For Ashley, Hot Spring, and Howard Counties, the 25-percent payments averaged \$4,300 or less from 1986 through 1999; Pike County averaged only \$10,600 per year. Three of these counties have less than 1,700 acres of National Forest System land; Pike County has 10,341 National Forest System acres.)

Counties selecting the “full payment amount,” on the other hand, receive payments based on an average of the three highest 25-percent payments to the state from fiscal year 1986 through fiscal year 1999. Full payment amounts, which typically are apportioned among counties based on their proportion of a national forest’s acreage, increase or decrease only in response to changes in the consumer price index for rural areas (published by the Bureau of Labor Statistics). Currently, among Ouachita National Forest counties, Garland, Logan, Perry, Polk, Montgomery, Saline, Scott, Sebastian, and Yell Counties in Arkansas and McCurtain and LeFlore Counties in Oklahoma have selected this payment method through fiscal year 2007.

Payments in Lieu of Taxes (PILT) are funds that the federal government transfers to counties with federal lands to help offset the non-tax status of those lands within their boundaries. For counties with National Forest System lands, PILT covers shortfalls from other payments (25 percent payments or “full payments,” as previously explained); in recent years, if the other payments compensated counties at a rate of less than about \$1.75 per acre, PILT made up the shortfall.

Direct, Indirect, and Cumulative Effects

Because the full payment amount is not based on current-year or future-year national forest revenues, none of the alternatives would have any direct, indirect, or cumulative effect on payments to counties selecting the “full payment amount,” as long as the Secure Rural Schools and Community Self-Determination Act, which is up for reauthorization in 2006, remains in force. If counties revert to or remain (in four cases) on 25 percent payments, their annual payments very likely will be highly variable, because they will be tied to fluctuating revenues from timber sales and minerals exploration and leasing operations. (Recreation revenues play little or no role in payments to counties, because most fees for camping and day use are reinvested in the developed recreation sites areas where fees are charged.) PILT would help dampen some of the variation in total compensation paid to counties under 25 percent payments. Because the alternatives differ little in

terms of projected gross revenues from timber sales and even less in terms of annual minerals activity, none of the alternatives will likely generate more timber- and minerals-associated revenues than the others; thus, even under the 25 percent payments system, the alternatives should not differ in terms of their direct, indirect, or cumulative effects on payments to counties.

Summary of Demographic and Economy Changes

Population and economic dynamics are changing at a moderate rate within the Forest analysis area. While population grew very slowly from 1980 to 1990, growth has seemed to increase substantially during the 1990s. The rate of increase was 15.8 percent over this period, about two percentage points ahead the growth rate of the comparison area Arkansas, but substantially over the 9.7 percent growth rate in Oklahoma. Increased population suggests the area may have new residents from outside the area, which will present non-traditional ideas from those of long-standing residents, possibly those that are non-commodity based.

Minority population's share has changed significantly within the analysis area from 1980 to 2000. Minority share has increased about five percent from 9.5 percent to 14 percent over this time, indicating significant growth. These numbers are less than the share found in the Arkansas and Oklahoma in 2000 (20 and 27.2 percent, respectively). This growth in minority population provides increased opportunities for minority participation in local recreation endeavors.

The analysis area's rural-urban characteristic has not changed significantly since 1980. Rural share was about 53 percent in both 1980 and 2000. The lack of large cities in the analysis area tended to keep the rural share even.

The area's economic health as measured by per capita income grew at a robust rate during the 1990s, 0.3 percent per year, greater than that of Arkansas's rate. Still, per capita income in 2000 was about \$1,200 less than that of the Arkansas and about \$2,000 less than Oklahoma.

The area's unemployment rate has decreased by 0.4 percent from 1995 to 2001. The rate in 2001 was equal to the rate of Arkansas, 5.1 percent, but much higher than that of Oklahoma, 3.8 percent. Income growth rate in this area has progressed steadily, indicating that the area is relatively economically strong. People with strong incomes and jobs are more likely to have free time and need an outlet for recreation.

The area's poverty rate has declined by over two percent from 1980 to 2000, 2.2 percent to 14.8 percent. Meanwhile, Arkansas's rate has decreased by 3 percent over the same time period to 16 percent and Oklahoma's rose by almost a percent and one half to 14.7 percent. Saline County's 7.2 percent poverty rate and a large population component in 2000 played a part in the favorable Forest county poverty rate versus that of the state.

Transfer payment in the Forest analysis area showed the same average annual real rate of growth from 1970 as that of the Arkansas (4.2 percent). Meanwhile Oklahoma's transfer payments grew from 1970 to 2000 by an average real rate of 3.6 percent. In constant 2000 dollars, payments increased by \$0.64 billion to \$2.2 billion in 2000. Therefore, the rate of government assistance for the analysis area is on par with that of the Arkansas, but ahead of that of Oklahoma.

Percentage of female head of households was lower than both state's percentage. Persons per household was slightly larger than both states' average, another good sign of an area lacking protracted economic problems.

Housing unit growth was slightly greater than that for Arkansas and more than twice as great as Oklahoma's growth rate for the 1990s, a sign of relative prosperity. Median housing value in 2000,

however, is still about \$12,500 less than the Arkansas's average of \$72,800, and about \$10,500 lower than Oklahoma's median housing value, a condition which can be expected with a larger urban component which tends to be associated with more demand for housing and thus higher prices.

The Forest analysis area's economy has become less reliant on the manufacturing sector. As measured by labor income, manufacturing produces about 27 percent of the salaries and wages in this economy during 2000. During the 1990s, the economy did not change drastically. Other than Manufacturing's change from a 31 percent to a 27 percent share of labor income, there was no other sector that had dramatic shifts in share other than government, which changed from 9 to 14 percent during the 1990 to 2000 period. Wood products manufacturing in 2000 held about an 8 percent share of the labor income share of the total Ouachita economy in 2000, down from about 10 percent in 1990. Wild land recreation, meanwhile, decreased marginally from 2.5 to 2.0 percent over the decade.

The Shannon-Weaver Entropy indexes show that the Ouachita analysis area has grown slightly more diversified overall since 1990. This would be expected in an expanding economy.

Since 1990, the area has changed from a marginally net importing regional economy with \$0.23 billion (in 2000 dollars) in imports to a significant importing area with \$3.2 billion in net imports in 2000. Because an economy grows with industries that produce for export, the Ouachita area must send its dollars outside the area to purchase goods and services for its economic consumption. Preferably an economy would rather attract new money via exports so that money may remain in the area to turn over in additional economic transactions before it leaks out. Economies that export more than they import are able to grow faster than those that are net importers.

Wood based industries have increased their exports over the decade from \$1.3 billion to \$1.6 billion in 2000. Other than Manufacturing, the only other major sector in this economy to be a net importer is Construction.

Thus, the economy and demography of this area appears to be healthy for a rural area. Population grew steadily in the 1990s; poverty is at a relatively low level. Housing construction is vigorous. The economy's composition has changed only marginally in the last decade. It has become more reliant on importation of goods and services, rather than production of its own goods and services for export. A fairly diverse economy has resilient characteristics that allow it to weather downturns in the economy. Most of the economic and demographic variables looked at in this overview were comparable with those of Arkansas and Oklahoma; therefore, most social and economic characteristics seem to be on par with both states.

Values, Attitudes, and Beliefs of Populations within the Forest Commuting Area

Public interest and desires are integral to the implementation of programs and activities related to forest management. In determining public preferences, the Ouachita National Forest developed and implemented programs of public information about plan revision and solicited the public's comments on topics likely to change or become controversial in the revision of the 1990 Forest Plan. Beginning in June 2002 and continuing throughout the course of plan revision, the Plan Revision Team visited with the public at 19 meetings and open houses. Citizens visited with Forest Service personnel and discussed issues such as off highway vehicle (OHV) use, inventories compiled to inform the plan, and proposed management alternatives. The Forest also provided periodic newsletters to keep citizens informed on plan issues and progress.

Meetings and open houses were scheduled at dates, times, and places thought to be convenient for the public. Care was taken to have meetings in both Oklahoma and in Arkansas. The OHV

meetings were well attended, and a variety of comments were received in regard to this one issue; however, the meetings to determine issues, inventory meetings, and plan alternative meetings were less attended and resulted in fewer comments in regard to plan content and direction than the OHV specific meetings. In order to obtain a more representative sample of public interest and to assure that the significant time and funds invested in developing the draft plan were well spent, the Forest commissioned a telephone survey within a 150-mile radius of the center of the Ozark-St. Francis National Forests and Ouachita National Forest (50-miles for the St. Francis National Forest) to determine the public's desires in regard to National Forest management. Appendix B contains the complete survey results, and results are tabulated in the analysis that follows.

Table 3.84 shows the percentage of respondents who indicated "yes" in response to questions regarding participation in specific recreational activities; subtracting the numbers shown from 100 percent yields the percent who responded "no."

Table 3.84 Public Participation in Recreational Activities

Activity	Percent Responding "Yes"
Mountain Biking	17
Horseback Riding on Trails	14
Day Hiking	27
Backpacking	7
Developed Camping	25
Visiting Wilderness	39
Gathering Mushrooms, Berries	32
Nature Viewing/Photography	56
Big Game Hunting	14
Small Game or Waterfowl Hunting	14
Driving for Pleasure	70
Off-Road Vehicle Driving	27
Freshwater Fishing	37
Canoeing or Kayaking	12
Rafting	19
Rock Climbing	05

Quite clearly, most people participate in the outdoors in their vehicle through driving-for-pleasure; nature viewing was second most predominant, and visiting a wilderness area was third.

Table 3.85 indicates which values respondents thought should receive most emphasis in national forest management. The ratings "Extremely Important" and "Important" need no explanation. Other responses, including "Not at all Important" and "Refused" combined with neutral responses represent the difference between 100 percent and the sum of "Extremely Important" and "Important."

Maintaining stream quality, providing healthy forests and providing habitat for fish and wildlife were highest in importance to the survey respondents.

Table 3.85 Survey Responses (Expressed as Rounded Percentages) to Different Values that could be Emphasized in National Forest Management

Forest Management Activity	Extremely Important	Important	Other Responses
	----- Percent -----		
Maintaining Stream Quality	86	06	08
Providing Outdoor Recreation	46	24	30
Providing Habitat for Fish and Wildlife	71	14	15
Providing Quiet Places for Renewal	53	19	28
Leave Forest in Natural Appearance	63	18	19
Emphasizing Planting Trees for Timber	59	18	23
Provide Access to Raw Materials	30	22	48
Protect Endangered Plants and Animals	62	16	22
Emphasize Managing Trees for Healthy Forests	70	16	14

Next, the survey asked respondents to rate the importance of various options for national forest management. Protecting older or continuous forest areas, important wildlife habitats, and sources of water and reducing the threat of wildfires were highest in importance to the survey respondents (Table 3.86). The ratings "Extremely Important" and "Important" need no explanation. Other responses, including "Not at all Important" and "Refused" combined with neutral responses represent the difference between 100 percent and the total of "Extremely Important" and "Important."

Table 3.86 Survey Responses (Expressed as Rounded Percentages) Concerning Different Options Available for National Forest Management

Management Activity	Very Important	Important	Other Responses
	----- Percent -----		
Restrict access for motorized OHV	33	20	47
Develop & maintain trail system for non-motorized use	34	29	37
Provide challenging motorized trails	20	16	64
Develop new paved roads to improve access	20	12	68
Designate primitive backcountry areas	41	22	37
Use control fires in wilderness to restore natural conditions	36	27	37
Protect areas that are sources of water	80	10	10
Manage forests for historical ecosystems	46	22	32
Manage forests to maintain today's conditions	58	24	18
Protect important wildlife habitats	67	17	16
Restrict harvesting & mining	24	19	57
Expand commercial recreation services	21	17	62
Introduce recreation fees for facility maintenance	35	27	38
Introduce a rec. fee for ORV use to maintain and improve ORV trails	30	18	52
Increase law enforcement	50	16	34
Create open areas in the National Forest	43	26	31
Manage Forests to increase wildlife populations for hunting	36	19	55
Protect older or continuous forest areas	63	20	17
Limit number of people on rivers at one time to avoid crowding	28	18	54
Use controlled fires to reduce threat of wildfires	52	22	26

Next, the survey focused on environmental attitudes of the public in the context of environmental issues affecting the “Ozarks and Ouachita Highlands.” The highest levels of agreement were tabulated for strengthening the Environmental Species Act, leaving management of public lands to trained professionals, and adding more controls on tourism and second home development. The highest levels of disagreement were for the assertions that “relying on wood products from other countries is preferable to relying on wood products from our National Forests” and “there is no justifiable reason for cutting trees on National Forest System lands.” Some environmental attitude responses are shown in Table 3.87 below.

Table 3.87 Environmental Attitudes

Attitude	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
Endangered Species Act should be strengthened	30	31	10	7
More important to protect streams for recreational fishing than other species or aquatic life	22	28	21	15
More controls needed on tourism and 2 nd home development	34	33	13	6
Preferable to import wood products than rely on wood products from national forests	13	25	20	26
No justifiable reason for cutting trees on National Forest System lands	31	17	24	21
Management of public lands should be left to trained professionals	48	30	8	5

This survey indicates that people have a relatively strong preference for environmental conservation. However, respondents were almost evenly divided in response to questions about the desirability of importing wood products rather than relying on wood products from national forests and whether there are “justifiable reasons” for cutting trees on National Forest System land. There was strong agreement with the idea that management of public lands should be left to trained professionals.

Effects on the Local Economy

Economic Effects

Economic impacts of each alternative are presented in the tables below. As shown, Alternatives B through E do not significantly change from the No Action Alternative (Alternative A). This is because the analysis realistically examined only what needed to change within the scope of current budgets and activity levels. This approach focuses more on the emphasis of activities than their relative magnitude. Using this approach, Alternative C demonstrates the most difference.

The tables either display estimates of employment shown as numbers of jobs, or Labor Income expressed in millions of dollars. With an indicated change of about 0.3 percent or less for employment and 1 percent or less for Labor Income, the differences among alternatives are not significant.

Table 3.88 shows how the alternatives compare in terms of jobs. Due to substitution effects from competing non-government sources (such as similar volume of timber harvesting which may occur on private lands if national forest timber is not offered to the market), these jobs are characterized as being associated with local economic activity initiated by Forest Service programs and activities, rather than caused by these activities.

Table 3.88 Employment by Program by Alternative (Average Annual, Decade 1)

Resource	Total Number of Jobs Contributed				
	Alt. A-NA	Alt. B	Alt. C	Alt. D	Alt. E
Recreation	1,234	1,234	1,234	1,234	1,234
Wildlife and Fish	359	359	359	359	359
Grazing	3	3	3	3	3
Timber	1,577	1,485	1,610	1,526	1,578
Minerals	17	17	17	17	17
Payments to States/Counties	127	120	130	123	127
Forest Service Expenditures	584	585	593	586	587
Total Forest Management	3,901	3,802	3,947	3,848	3,905
Percent Change from Current	0.0%	-2.5%	1.2%	-1.3%	0.1%

Table 3.89 shows how the alternatives compare in terms of labor income. While the difference between alternatives is insignificant, the slight difference in levels of management activity is reflected in the table as Forest Service expenditures and is reflected as a Percent Change from Current.

Table 3.89 Labor Income by Program by Alternative (Average Annual, Decade 1; \$1,000,000, shown in 2005 \$'s)

Millions of dollars					
Resource	Alt. A-NA	Alt. B	Alt. C	Alt. D	Alt. E
Recreation	\$20.5	\$20.5	\$20.5	\$20.5	\$20.5
Wildlife and Fish	\$6.0	\$6.0	\$6.0	\$6.0	\$6.0
Grazing	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02
Timber	\$55.5	\$52.2	\$56.6	\$53.7	\$55.5
Minerals	\$0.6	\$0.6	\$0.6	\$0.6	\$0.6
Payments to States/Counties	\$4.4	\$4.2	\$4.5	\$4.3	\$4.4
Forest Service Expenditures	\$20.5	\$20.6	\$21.4	\$20.7	\$20.8
Total Forest Management	\$107.5	\$104.1	\$109.7	\$105.7	\$107.8
Percent Change from Current	0.0%	-3.2%	2.0%	-1.6%	0.3%

Table 3.90 shows how the alternatives compare in terms of employment by industry. While the difference between alternatives is insignificant, the slight difference in levels of management activity is reflected in the table. These differences are spread across the economic sectors based upon regional economic multipliers.

Table 3.90 Employment by Major Industry by Alternative (Average Annual, Decade 1)

Total Number of Jobs Contributed					
Sector	Alt. A-NA	Alt. B	Alt. C	Alt. D	Alt. E
Agriculture	960	906	906	929	960
Mining	17	17	17	17	17
Construction	42	40	43	41	42
Manufacturing	461	436	469	448	461
Transportation & Warehousing	46	44	47	45	46
Wholesale trade	40	39	41	39	40
Retail trade	75	73	77	74	75
Information	44	44	45	44	44
Finance, Insurance, & Real Estate	68	67	69	67	68
Services	1,657	1,649	1,665	1,653	1,659
Government (Federal, State, & Local)	485	480	488	482	485
Utilities	6	6	6	6	6
Total Forest Management	3,901	3,802	3,947	3,848	3,905
Percent Change from Current	0.0%	-2.5%	1.2%	-1.3%	0.1%

Table 3.91 shows how the alternatives compare in terms of labor income by major industrial sector. While the difference between alternatives is insignificant, the slight difference in levels of management activity is reflected in the table. These differences are spread across the economic sectors based upon regional economic multipliers.

Table 3.91 Labor Income by Major Industry by Alternative (Average Annual, Decade 1; \$1,000,000; 2005 \$'s)

Millions of Dollars					
Sector	Alt. A-NA	Alt. B	Alt. C	Alt. D	Alt. E
Agriculture	\$29.7	\$28.0	\$30.3	\$28.7	\$29.7
Mining	\$0.7	\$0.7	\$0.7	\$0.7	\$0.7
Construction	\$1.2	\$1.1	\$1.2	\$1.1	\$1.2
Manufacturing	\$19.7	\$18.6	\$20.1	\$19.2	\$19.7
Transportation & Warehousing	\$1.9	\$1.9	\$2.0	\$1.9	\$1.9
Wholesale trade	\$1.6	\$1.5	\$1.6	\$1.6	\$1.6
Retail trade	\$1.6	\$1.6	\$1.6	\$1.6	\$1.6
Information	\$1.9	\$1.9	\$1.9	\$1.9	\$1.9
Finance, Insurance, & Real Estate	\$1.8	\$1.8	\$1.9	\$1.8	\$1.8
Services	\$28.7	\$28.4	\$29.0	\$29.5	\$28.8
Government (Federal, State, & Local)	\$18.3	\$18.2	\$19.0	\$18.3	\$18.5
Utilities	\$0.4	\$0.4	\$0.4	\$0.4	\$0.4
Total Forest Management	\$107.5	\$104.1	\$109.7	\$105.7	\$107.8
Percent Change from Current	0.0%	-3.2%	2.0%	-1.6%	0.3%

Table 3.92 shows how the alternatives compare in terms of Forest Service Revenues and Payments to Counties. While the difference between alternatives is insignificant, the slight difference in levels of management activity and timber product values is reflected in the table as a change in Timber and in Total Revenues.

Table 3.92 Forest Service Revenues and Payments to Counties (Annual Avg, 1st Decade; \$1,000,000; 2005 \$'s)

Forest Service Program	Alt. A-NA	Alt. B	Alt. C	Alt. D	Alt. E
Recreation	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Wildlife and Fish	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Grazing	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Timber	\$24.3	\$22.9	\$24.8	\$23.5	\$24.3
Minerals	\$1.9	\$1.9	\$1.9	\$1.9	\$1.9
Soil, Water & Air	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Protection	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1
Total Revenues	\$26.3	\$24.9	\$26.8	\$25.5	\$26.3
Payment to States/Counties	\$6.3	\$6.3	\$6.3	\$6.3	\$6.3

Table 3.93 shows how the alternatives compare in terms of Cumulative Economic Impacts. While the difference among alternatives is insignificant, the slight difference in levels of management activity is reflected in the table. These differences are a reflection of the application of regional economic multipliers.

Table 3.93 Cumulative Economic Impacts in 2018

	2003		2018					
	Area	Forest	Area	Forest Portion				
Economic Indicator	Totals	Portion	Totals	Alt. A-NA	Alt. B	Alt. C	Alt. D	Alt. E
Employment								
Total (jobs)	215,994	3,894	291,719	3,894	3,796	3,941	3,842	3,898
% of Area Totals	100%	1.8%	100%	1.3%	1.3%	1.4%	1.3%	1.3%
% Change from No Action	---	---	---	0.0%	-2.5%	1.2%	-1.4%	0.1%
Labor Income								
Total (\$ million)	\$5,606.0	\$107.2	\$8,451.0	\$107.2	\$103.8	\$109.4	\$105.5	\$107.6
% of Area Totals	100%	1.9%	100%	1.3%	1.2%	1.3%	1.2%	1.3%
% Change from No Action	---	---	---	0.0%	-3.2%	2.0%	-1.6%	0.3%

Table 3.94 shows the current Role of Forest Service-Related Contributions to the Area Economy. This table provides good indicators as to why so little impact is shown by alternative. The total economic contribution related to Forest Service activities is less than two percent of the total. When measured against the Area economy, each alternative will not have any significant economic impact due to the relative size of the economy. The opportunities for significant economic contribution occur more at the local community level and are better examined during project implementation.

Table 3.94 Current Role of Forest Service-Related Contributions to the Area Economy

Industry	Employment (Jobs)		Labor Income (\$ million)	
	Area Totals	FS-Related	Area Totals	FS-Related
Agriculture	14,793	960	\$239.7	\$29.7
Mining	2,358	11	\$123.0	\$0.5
Construction	16,943	42	\$445.9	\$1.2
Manufacturing	51,466	461	\$1,917.4	\$19.7
Transportation & Warehousing	6,345	46	\$254.8	\$1.9
Wholesale trade	5,988	40	\$227.2	\$1.6
Retail trade	30,470	74	\$657.6	\$1.6
Information	2,830	44	\$132.8	\$1.9
Finance, Insurance, & Real Estate	12,487	68	\$316.8	\$1.8
Services	84,834	1,657	\$2,213.5	\$28.6
Government (Federal, State, & Local)	27,595	485	\$1,023.5	\$18.3
Utilities	1,002	6	\$60.1	\$0.4
Total	257,108	3,894	\$7,612.4	\$107.2
Percent of Total	100.0%	1.5%	100.0%	1.4%

Social Impacts

In this section, a discussion of the social effects of each alternative is presented including the "No Action" alternative (1990 Forest Plan).

Data from the attitudes, values, and beliefs identified by the survey as well as the information gathered at the meetings were used to develop a range of alternatives for forest management. The display below represents a continuum with alternatives featuring a greater range of management activities displayed on the left and those with fewer management activities on the right. Following the array is a discussion of each alternative and its potential social and economic impacts.

Greater Management Activities

Fewer Management Activities

C → E → D → B → A

Alternative A. This alternative is the “baseline” or no-action alternative to which the four action alternatives are compared. Under this alternative, forest management would be maintained, and no changes to address identified issues would be proposed. Outbreaks of southern pine beetle would continue to be treated as they occur; however, no increased emphasis for treatment of systems susceptible to oak decline or other treatments to oak-dominated ecosystems would be implemented. Alternative A would maintain current practices, though it should be recognized that changes in management practices could be mandated as the Forest responds to the requirements of the Healthy Forest Initiative. The existing base of suitable acres for timber (1,019,694 acres) remains intact. Likewise, no areas would be recommended for removal from mineral entry, and no changes to existing activities in other, non-timber forest products would be planned. This alternative continues the current relationship with adjacent forest communities, and no changes are expected in Forest product related income or jobs under this alternative.

The Forest’s existing Visual Management System would remain in effect. Recreation opportunities of all types would remain as currently managed. Recreation opportunity would remain at current levels for each class. No new wilderness or semi-primitive recreational opportunities would be proposed. User conflicts—such as hunters versus hikers, horses versus bicycles, or motorized users versus solitude-seekers—would continue and would likely increase as the level of use increases over time. Cross-country travel by foot or vehicle would result in more user-created trails and travel ways as users seek new experiences or settings.

Alternative B. This alternative would differ from Alternative A by a modest increase in emphasis on ecosystem health and sustainability. Suitable timber production acres would be approximately 1,019,694. There would be no new recommendations for wilderness study areas or other national designations for land under this alternative that would reduce the suitable timber acres. The Forest would address impacts and opportunities to local communities as a result of implementation of the Healthy Forest Initiative and would alter intensity and location of forest health activities as required by conditions.

The forest visual resources and recreation opportunity would continue to be managed under existing inventories and systems, similar to Alternative A. Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input.

Alternative C. This alternative would have a slightly reduced suitable timber base, 1,017,901 acres, as the result of three small areas that would be proposed as additions to Flatside Wilderness (620 acres), the East Unit of Poteau Mountain Wilderness (77 acres) and to Upper Kiamichi Wilderness (1,096 acres). These areas would be managed to retain their wilderness character until Congress decides their ultimate disposition. However, little, if any, change in actual timber management activity would occur as a result of these recommendations.

Alternative C provides more emphasis than the 1990 Forest Plan on ecosystem health and sustainability, including increased active management to restore and maintain native pine-grass and oak woodlands. A greater intensity of thinning and the largest allocation of all alternatives (250,000 acres) in prescribed fires within pine-oak and some hardwood-dominated communities would be accomplished. Limited streamside vegetative management would be allowed to meet ecosystem health objectives.

The Scenery Management System would replace the existing Visual Management System as the inventory and management system for visual resource management. To meet established road miles per square mile objectives, areas of the Forest with a high density of non-National Forest System Roads (private, local, state and Federal roads and highways) would be recalculated and open road density figures for those areas would be adjusted by excluding non-National Forest

System Roads from the calculation. Cross-country travel by motorized vehicles would be considered unsuitable and a system of designated routes would need to be developed with appropriate public input.

This alternative would increase the potential for reduction of fuels in the wildland-urban interface and increases potential for short-term impacts from prescribed fire smoke. Vegetation management under Alternative C would address the most acres of any of the alternatives with treatment of 677,000 acres in the first ten-year period.

Alternative D. This alternative would emphasize recreation opportunities, scenery management, "watchable wildlife," and wilderness resources. Three areas would be recommended for wilderness study, Brush Heap, Blue Mountain, and Irons Fork Mountain, containing a total of 28,334 acres. These three areas, plus additions to Flatside Wilderness (620 acres), the East Unit of Poteau Mountain Wilderness (77 acres), and Upper Kiamichi Wilderness (1,096 acres) would be recommended for wilderness designation. The existing suitable timber base under this alternative would be reduced by the recommended wilderness acres to 989,567 acres. This alternative would slightly increase economic impacts associated with tourism and recreation and would slightly decrease economic potential as a result of reduced timber harvest potential.

The 1990 Forest Plan projections for prescribed fire and other forms of forest management would be maintained; however, the emphasis of this activity would be redirected to Old Growth and shortleaf pine bluestem grass ecosystems, walk-in turkey areas, and wildlife management areas. Alternative D would have fewer acres in uneven-aged management than Alternative A, but more than Alternatives B, C, or E. Streamside Management Areas would be maintained; however, some timber harvest and vegetation management would take place to meet ecosystem health objectives.

This alternative would replace the Visual Management System with the Scenery Management System, and would place the greatest emphasis on scenery management of any alternative. Increased scenery management would be most apparent along higher traffic road corridors (two of which are Forest Scenic Byways and two of which are State of Oklahoma Scenic Drives) and in the viewing area of forest lakes.

Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input. An exception for retrieval of big game would be allowed.

Alternative E. Forest management practices would be similar to Alternative C, but contain some elements of Alternatives B and D as well. Management practices would focus on ecological conditions for diversity and forest health in a portion of the forest and recreation and scenic values in other parts of the forest.

As in Alternative C, three small wilderness additions (Flatside, Poteau Mountain, and Upper Kiamichi) would be recommended, removing 1,793 acres from the suitable timber base of the Forest. Suitable acres for timber production would be 1,016,228 acres.

Management in semi-primitive areas, the Winding Stair National Recreation Area and near-lake areas would be driven by scenery management needs with increased emphasis along high traffic roads, trails, and lake areas. All vegetation management would promote "watchable wildlife," including important birding areas.

To meet established road miles per square mile objectives, areas of the Forest with a high density of non-National Forest System Roads (private, local, state, and Federal roads and highways) would be recalculated, and open road density figures for those areas adjusted by excluding non-National

Forest System Roads from the calculation. Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input.

Economic Efficiency

Table 3.95 evaluates economic efficiency by listing estimated benefits, costs, net benefits, and cumulative present net value (PNV) by alternative. All figures are in 2005 dollars. The benefits in Table 3.95 include market values and non-market assigned values. Market values include those values where the Forest Service receives money such as for timber, minerals, range, or special uses. Non-market values are assigned values for amenities such as wildlife and recreation.

Table 3.95 Cumulative Present Values of Costs and Benefits in Thousands of Dollars

	Alt A	Alt B	Alt C	Alt D	Alt E
Cumulative Total Present Net Value	\$1,017,153	\$1,160,993	\$1,327,225	\$1,212,226	\$836,911
Present Value benefits by Program:					
Range:	\$78	\$78	\$78	\$78	\$78
Timber:	\$1,122,320	\$1,276,685	\$1,468,583	\$1,330,721	\$948,560
Minerals:	\$37,081	\$37,081	\$37,081	\$37,081	\$37,081
Recreation	\$232,986	\$232,986	\$232,986	\$232,986	\$232,986
Wildlife:	\$282,178	\$282,178	\$282,178	\$282,178	\$282,178
PV of Benefits	\$1,674,642	\$1,829,008	\$2,020,906	\$1,883,044	\$1,500,883
Present Value costs by Program:					
Range:	\$3,905	\$3,905	\$3,905	\$3,905	\$3,905
Timber:	\$223,941	\$230,562	\$237,261	\$230,799	\$220,550
Roads/ Engineering	\$167,328	\$167,328	\$167,328	\$167,328	\$167,328
Minerals:	\$5,606	\$5,606	\$5,606	\$5,606	\$5,606
Recreation	\$56,114	\$56,114	\$56,114	\$56,114	\$56,114
Wildlife:	\$56,975	\$56,975	\$56,975	\$56,975	\$56,975
Soil, Water, Air	\$17,656	\$17,656	\$17,656	\$17,656	\$17,656
Protection/ Forest Health	\$125,963	\$129,868	\$148,836	\$132,435	\$135,838
PV Costs	\$657,489	\$668,015	\$693,681	\$670,818	\$663,972

Since all alternatives presumed no change in the Range and Minerals program and that wildlife and recreation amenities would satisfy estimated demand levels, timber values are the only benefit values that change by alternative. This change in timber values reflects a combination of differing levels of total harvest and harvesting of products with different market values.

All alternatives presumed no change in budget levels for any programs other than Timber and Protection/Forest Health; therefore, these are the only costs that change by alternative. The changes in Timber costs reflect a combination of different harvest levels and product mixes. The change in Protection/Forest Health costs reflect different levels of Forest Health related prescribed fire. While the Timber costs are associated with similar changes in timber benefits, Forest Health costs are related to ecological changes that are not measured in dollars. This partially accounts for the range of differences in Present Net Value, Present Value of Benefits, and Present Value of Costs by Alternative.

Alternative A. This alternative would have the fourth highest PNV with a combination of the fourth highest Benefits and the lowest Costs. Harvest levels would rise quickly to the Long Term Sustained Yield capacity (by the second 10-year period) generating a high level of dollar benefits. Very little of the timber activity would occur in hardwood types where the benefit values would be lower.

Alternative B. This alternative would have the third highest PNV with a combination of the third highest Benefits and third lowest Costs. Harvest levels would rise quickly to the Long Term Sustained Yield capacity (by the second 10-year period) generating a high level of dollar benefits. Little timber activity would occur in hardwood types where the benefit values would be lower.

Alternative C. This alternative would have the highest PNV with a combination of the highest Benefits and the highest Costs. Harvest levels would rise quickly to within 98 percent of the Long Term Sustained Yield capacity (by the second 10-year period) generating a high level of dollar benefits. Much of the timber activity would occur in hardwood types where the benefit values are lower. This alternative also would have the highest Forest Health treatment costs. These factors would combine to make it the highest cost alternative.

Alternative D. This alternative would have the second highest PNV with a combination of the second highest Benefits and the second lowest Costs. Harvest levels would rise quickly to the Long Term Sustained Yield capacity (by period 2) generating a high level of dollar benefits. Less timber activity would occur in hardwood types where the benefit values are lower. This alternative also would have high Forest Health treatment costs.

Alternative E. This alternative would have the lowest PNV with a combination of the lowest Benefits and the second lowest Costs. Harvest levels would rise slowly to within 87 percent of the Long Term Sustained Yield capacity (by period 2) generating a lower level of dollar benefits while recognizing the tradeoffs to meet ecological objectives. Much of the timber activity would occur in hardwood types where the benefit values would be lower. This alternative also would have a high Forest Health treatment cost. While this alternative would be both low cost and the lowest benefit alternative (when evaluated in dollars), it would have a moderate level of spending for Forest Health related activity. This added cost would be offset by a slower rise in timber harvest levels with an associated lower timber cost.

Lands

Of the 2,509,589 acres within the Forest boundary, 1,780,457 acres (as of 9/30/04), or 71 percent are lands administered by the National Forest. Of this total, approximately 701,000 acres have Public Domain status. This total is updated at the end of each fiscal year reflecting changes due to land adjustment activities during that fiscal year.

Landownership adjustment is a program for acquiring or exchanging land or interests in land for public benefit. Private land suitable for Forest purposes that will consolidate Forest lands may be considered for interchange, exchange, purchase, or donation. Forest lands that are isolated, detached, projecting narrow strips are considered for disposal through exchange. Lands that would yield greater public benefit in private ownership are also considered for disposal through exchange.

Land and Water Conservation funds (L&WCF), if available, can be used to purchase priority tracts. Land exchange is also a valuable tool; however, it is more expensive and time consuming than purchase. Priority is given to exchanges that 1) consolidate National Forest System lands; 2) acquired lands with significant resource benefits; 3) dispose of lands that are isolated or have lost

National Forest character; 4) provide for community expansion/enhancement; or 5) protect and enhance access rights of the United States.

A scattered ownership pattern compounds management problems and hinders the public use and enjoyment of Forest lands. Intermingled ownership results in numerous problems concerning boundaries, title claims, and encroachments. Rights-of-way for public access into these lands become increasingly difficult to acquire. Over the past 15 years, tens of thousands of acres have been acquired through purchase and exchange, greatly increasing management efficiency by consolidating lands, reducing landlines and corners to maintain, decreasing habitat fragmentation, and decreasing the need for right-of-way acquisitions. Land exchange is also a tool sometimes used to resolve boundary and use conflicts when the opportunity arises.

Resource protection and management require unrestricted easements for the Forest transportation system. Private tracts are intermingled with Federal ownership. Rights-of-way must be obtained over private tracts to provide access to the many isolated parcels of Forest lands. During the last five-year period, an average of two rights-of-way cases per year were processed.

Land Boundary Management

The Forest boundary management program entails both the location and maintenance of property corners and boundary lines so that they are legally defensible, visible, and preferably conflict free. Land boundaries across the Forest total approximately 4,300 miles. Projected constrained budgets will necessitate a collaborative forest-wide effort to prioritize boundary management needs for efficient program management.

Occupation Conflicts

Unauthorized occupations of Forest lands are treated as conflicts requiring resolution. Resolutions may include: allowing continued occupancy under a permit; processing a claim of unwritten rights alleged to be superior to the written land title of USA; processing a Small Tracts Act case (sale, interchange, or exchange) where improvements were located on USA through reliance on a defective survey; or prosecuting a case of willful trespass. Each case will have its own unique set of facts that must be clearly understood in order to determine and arrive at the appropriate resolution. An inventory of occupation conflicts is maintained with cases prioritized to efficiently allocate limited program resources.

Direct, Indirect, and Cumulative Effects

Adjustments to the land boundaries of the National Forest System lands are accomplished under standard criteria. A map of National Forest System lands available for exchange is maintained in the Forest Supervisor's office, with copies in District Offices. The types of lands that will be considered suitable for acquisition through purchase, exchange, or donation are described in the Landownership Adjustment Strategy, available at the Forest Supervisor's Office. Because each tract of land subject to acquisition or disposal is unique, it is beyond the scope of the Forest Plan to address the effects of land exchanges. Such effects are addressed at the time that the land exchange takes place. The land program does not change by alternative.

Land Uses – Special Uses

All uses and occupancy of National Forest System land, except for disposal of timber and other forest products, minerals, and grazing of livestock, are designated as "special use." Proposals for use are screened prior to acceptance of an application and must receive an authorization prior to occupancy of National Forest System lands unless that requirement is waived by the regulations

pertaining to special uses. The Forest receives about 100 inquiries for use of Forest lands each year. About 80 of these inquiries result in applications for new permits or amendments to permits or easements. The number of inquiries and permits issued has almost doubled since the last planning period, and this upward trend is expected to continue.

Easements, special-use permits, and communication site leases are used to authorize the occupancy use and rights of Forest lands. As of September 2004, the Forest had 549 active special-use permits for 6,100 acres of Forest land and 738 miles of utility lines, roads, and water transmission lines. Annual Forest receipts from special-use permits are about \$149,000. This amount is expected to increase as new uses are authorized and fees for existing uses are adjusted to reflect fair market value for the use of National Forest System lands.

Each land use authorization contains terms and conditions designed to protect the public interest in accordance with applicable statutes, rules, and regulations. Periodic reviews and inspections of land uses seek to ensure that the terms and conditions are met and to identify and correct non-compliance with permits. All alternatives would require the same management direction for proposal screening.

The Forest has approximately 10 special use permits that were issued under now expired authorities for uses no longer permitted on National Forest System lands. The Forest will look for opportunities to eliminate these occupancies through available land adjustment authorities or by requiring the removal of the occupancy at the end of the permit term. Occupancies previously authorized by agreements such as Memoranda of Understanding and Interagency Agreements will be replaced with special use permits, leases, or easements as these agreements expire.

Uses of National Forest System land that create a permanent occupancy will not be authorized. Examples of such a use are recreation residence permits and sanitary landfills. The Forest has no recreation residence permits or landfill permits, and none will be issued.

More than 30 miles of utility corridors are on the eastern part of the Forest. These corridors are used by Reliant Corporation, Arklahoma Corporation, Mobil Pipeline, and Entergy. Whenever possible, utility companies and highway departments jointly use right-of-way corridors.

New utility corridors will follow existing significant transportation and utility corridors to the extent practicable. Existing and planned corridors are discussed in the section on Facilities. When it is not practicable to follow existing corridors, the following are examples of the criteria to be used in determining locations:

- Minimize occupied acres by using the most direct route confined only to essential clearing limits
- Avoid slopes in excess of 35 percent whenever possible (ideal locations would be less than 8 percent)
- Circumvent capital improvements, recreation areas, wilderness areas, scenic areas, and other high resource value areas
- Ascertain net public benefits (benefit-cost analysis)

Sixteen PL-566 reservoirs within the Forest are under special use permit to state and local government agencies. For the existing permitted reservoirs, the Forest will cooperate with the holders to the extent practicable in the management of these facilities. PL-566 reservoirs are multipurpose installations for recreation, water supplies, flood control, and fishing. Depending on intended use, coordination with state fish and wildlife agencies, state Health Departments, Corps of Engineers, Federal Power Commission, National Resource Conservation Service, Research Conservation and Development Districts, and county and city governments is required for effective

permit administration. Construction of new PL-566 reservoirs will be discouraged under the action alternatives.

Wind generation is also gaining acceptance as an alternative energy source in some regions of the United States. Although the Ouachita National Forest has no special use authorizations issued for wind generation, the Forest has been identified as having a high potential for development by the industry. Wind farms are located on mountain crests or in expansive open areas where wind currents are a reliable source of power.

Each application for a permit is screened and evaluated to determine if it is allowed by law and is in the public's best interest. No permits for occupancy of National Forest System land can be issued unless authorized by a specific law. The Forest currently administers 543 permits. Table 3.96 shows the types and permits issued on the Forest in 2003 and 2004.

Table 3.96 Distribution of Major Special Use Permits, 2004

Type of Permit	Amount 2003	Amount 2004
Recreation	48	52
Agriculture	8	8
Community and Public Information	20	21
Research, Study, and Training	7	13
Transportation	284	295
Communications	69	78
Water Uses	46	48
Industry	20	22

Direct, Indirect, and Cumulative Effects

Annually, the number of requests for special use permits is growing. With a fragmented ownership pattern, the requests for use of National Forest System land will not change substantially with any of the alternatives. Over time, requests for authorizations would probably increase as rural lands are developed. With emphasis on scenic quality and recreational opportunities, Alternative D could stimulate requests for new permits. Land use proposals are generated by the public; therefore, the number of applications and subsequent authorizations cannot be controlled by the Forest Service or even accurately predicted. These proposals would be assumed to be the same for all alternatives and would be assumed to have similar effects.

During the past 30 years, industry, public utilities, and government agencies have increased demand for electronic sites within the Forest. Because communication facilities have been found to have detrimental effects on some mammals and migratory bird species and also affect visual resources, new electronic uses are confined to existing approved sites. Site plans for existing approved sites will be updated and modified to include tower construction restrictions designed to protect wildlife and visual resources. Generally, reducing tower height below 200 feet releases the tower owner from lighting requirements for the safety of aircraft; however, this is not always the case. The Federal Aviation Administration conducts a flight path study to make the determination if tower lighting is required. Therefore, it is possible that reducing tower height may not result in fewer lighted communication towers on the Forest if the towers are within a flight path.

While reduced tower height and elimination of supporting wires are believed to reduce the negative effects of towers on wildlife and visual resources, the effects on current and future permit holders may be a decrease in effectiveness of the towers, an increase in the number of antennas needed, and an increase in power usage. The effective tower range is expected to decrease. This may

result in the need for additional towers to be built to maintain the existing coverage area or existing users abandoning the sites for more favorable locations. Lower tower height may also discourage additional holders or tenants from occupying the sites because tower space at the optimum higher levels is not available, and the tower space that is available may not be high enough to connect them with other towers. Microwave users are more likely to be affected by changes in tower height because of dependency on line of site communications. Other users may be able to compensate for the shorter height by changing equipment and increasing power of transmissions. Shorter towers will reach antenna holding capacity sooner than taller towers resulting in requests to construct additional towers on the site. Requiring self-supporting towers or monopoles instead of wire supported towers is not expected to increase costs to holders for tower replacement or for initial construction. Self-supporting towers have a larger footprint at the base of the tower than towers supported by wires, but the larger tower base needed for a self-supporting tower is offset by a much larger cleared area required under towers supported by wires. Monopole towers tend to be shorter than other towers and may be camouflaged to blend in with surrounding vegetation. The camouflage capability of monopole towers may be useful in reducing adverse effects on visual quality.

The effects of wind generation facilities on wildlife are not completely known although preliminary data suggest that noise disturbance from wind generation affects nesting of some bird species, and there has been increased mortality to bats and migratory birds attributed to these facilities. The Forest will continue to manage the currently designated communication sites. If new communication sites are proposed, the sites will be designated by following the formal process found in the Forest Service Handbook (FSH 2709.11).

Only slight differences in effects on special uses are anticipated by alternative. Little change from the current condition is expected under Alternative B. The effects of implementing Alternative C could result in conflicts between management practices to improve forest health and uses authorized under existing permits. Potential conflict could arise when prescribed fires are in or near permit areas or from smoke impacting instruments at some facilities. Because Alternative C has the potential to result in construction of additional temporary roads, that alternative may also result in more requests for access across National Forest System lands using roads constructed for vegetative management activities. Under Alternative D, proposals located along high traffic roads will become more expensive for the permit holder to implement due to the cost to mitigate or relocate uses to protect views. Alternative E will most likely have the same effects as Alternatives C and D, but to a lesser degree.

Alternatives proposing to add wilderness areas will have no measurable effect on existing uses. Designating land as wilderness will decrease the amount land available for certain types of uses such as communication facilities.

Facilities

Transportation Facilities

The Forest road system is extensive and complex. Facilities accommodating wheeled vehicles ranging from passenger cars to double tree-length log trucks are of primary concern. The road system's ability to meet user needs ranges from completely adequate to totally inadequate, depending on condition and intended use. The Forest roads inventory contains pertinent information for each road and trail. A set of road maps (7.5 minute series USGS quadrangle base) with transportation information is maintained in the Forest Supervisor's office. Table 3.97 summarizes the road inventory as of September 30, 2004. This inventory is a record of roads contained in the Forest database, INFRA. Although roads are included in the Forest database, the

mileages are not associated with jurisdictional boundaries, and the database includes roads that extend outside of the Forest boundary and roads on private land as well as on National Forest System land.

Table 3.97 Road Miles by Surface Type as of September 30, 2004

Jurisdiction	Surface Type						Total Miles
	Asphalt	Crushed Aggregate	Bituminous	Improved	Native	Paved	
County	1	1,055	274	178	53	19	1,580
Forest Service	14	2,018	23	752	2,965	0	5,772
Private	0	54	6	31	54	0	145
State	82	3	1,091	0	0	50	1,226
Total Miles	97	3,130	1,394	961	3,072	69	8,723

Source: INFRA

Roads are classified as arterial, collector, or local. Arterial roads are generally heavily traveled, multipurpose access routes for areas in excess of 30,000 acres. Collector roads provide access to areas of intermediate size. Local roads are generally lightly traveled, single purpose access routes for areas less than 5,000 acres.

Management and operation of Forest roads involve cooperative agreements, cost share agreements, closures, obliterations, road use permits, and road maintenance. Forest Development Road Cooperative Agreements exist with Garland, Logan, Montgomery, Perry, Polk, Saline, Scott, Sebastian, and Yell counties in Arkansas and with LeFlore and McCurtain counties in Oklahoma. Each agreement identifies roads by jurisdiction and provides a process for one party to improve a road under the other's jurisdiction.

The Forest and Weyerhaeuser Company entered into a Road Right-of-Way Construction and Use Agreement (cost share) in 1971 that provides for development, operation, use, and maintenance of a road system to serve both parties. Initially, roads totaling 371 miles were designated as cost share roads. At the end of FY 2003, 201 cost share supplements had been executed that added an additional 180 miles to the cost shared network.

Each road under Forest maintenance responsibility is maintained at one of five maintenance levels. Roads requiring only custodial care, with closures of a minimum of one year, are Level 1. Primitive roads permitting limited passage of high clearance vehicles are Level 2. Roads maintained for safe and moderately convenient travel suitable for passenger cars on which the average daily traffic is generally less than 15 are Level 3. Roads with average daily traffic ranging from 15–100 are Level 4, and roads with average daily traffic exceeding 100 are generally Level 5. User comfort is an increasingly important consideration from Levels 3 to 5.

County and state roads within and adjacent to the Forest totaling 427 miles in Oklahoma and 1,793 miles in Arkansas were nominated to the Federal Highway Administration (FHWA) for inclusion in the Forest Highway Program. On March 1, 1983, 89 routes totaling 516 miles were approved as Forest highways in and around the Forest (308 miles in Arkansas and 208 miles in Oklahoma). Routes necessary to protect the Federal interest with respect to the Forest system were designated as Forest highways. Submitted routes not designated were deemed to be of greater importance to the state/local transportation network than for management of the Forest and its related traffic. A map of Forest highways is maintained in the Supervisor's Office at Hot Springs, Arkansas.

Three types of timber access roads are built on the Forest. The lowest standard is a temporary road used in areas where future access is not planned. When its use is completed, the road is decommissioned. The other two basic roads are permanent facilities that are used and managed to provide for present and future access needs. The lowest standard permanent road is suitable only for high clearance vehicles, generally unsurfaced, uses outsloped sections, and is usually closed to traffic for a minimum of one year between timber sales or other activities. This standard of road is Traffic Service Level (TSL) D and, if closed between uses, is intermittent service. The next higher standard permanent road is TSL C. TSL C roads are generally surfaced and are built and maintained for safe use by passenger cars. They are typically open year round for constant service. As user comfort, traffic flow, user costs, and safety factors become increasingly more important, access roads are built and operated at one of the two higher standards, TSL B or TSL A. Table 3.98 shows the road miles by jurisdiction and maintenance level for the Forest, and Table 3.99 shows the transportation network by maintenance level.

Table 3.98 Maintenance Level of Forest Service Roads of September 30, 2004

Jurisdiction	Maintenance Level					
	1	2	3	4	5	Total
National Forest	2,741	1,688	1,122	200	21	5,772

Source: INFRA

Table 3.99 Transportation Network by Maintenance Level as of September 30, 2004

Total Inventory	Arterial	Collector	Local	Total
Miles	785	2,355	5,583	8,723
Percent	9	27	64	
National Forest System Roads Only	Arterial	Collector	Local	Total
Total	57	693	5,022	5,772
Percentage	1	12	87	

Source: INFRA

Direct, Indirect, and Cumulative Effects

Forest roads are designed to specifications that provide safe travelways, while protecting forest resources. Roads expose and compact soils and alter surface water flow. Roads also fragment wildlife habitat. With the exception of minor differences due to wilderness recommendations, the alternatives do not differ with respect to the future road system. Therefore, there are no differences in effects among alternatives. A forest-wide Roads Analysis was conducted to inform the Forest Plan decision, and it was determined that the current inventory meets the current transportation needs for Level 3, 4, and 5 roads. Some shifting in maintenance level may occur (some Level 2 roads may become Level 3 roads and vice versa), but overall miles of road in these categories will remain essentially the same. Effects of roads have been analyzed in the appropriate sections of this chapter (see the Soils, Terrestrial Habitat and Species, and Aquatic Habitat and Species sections). Closures of roads apply to Level 1 and 2 roads within the Forest system and are covered by separate environmental analysis at the time of the action. Likewise, temporary roads (for timber operations) are covered by project level environmental analysis.

Non-Transportation Facilities

The Forest is reviewing existing facilities and administrative sites to determine which sites or facilities should be disposed of or sold. Any revenue generated from the sale or disposal of these facilities is to be deposited into a Sisk Act Account to provide for deferred maintenance or construction of new facilities. This authority was provided by the Interior Appropriations Act for Fiscal Year 2006, Title V. Forest Service Facility Realignment and Enhancement. There are no differences by alternatives for the non-transportation facilities. The information below is presented to provide context information for structures and utilities.

Structures

The Forest Facility Master Plan, signed March 8, 2004, provides guidance for the continued use, maintenance, improvement, and disposal of facilities on the Forest for the next decade. The Facility Master Plan states that there are 147 administrative structures on the Forest, 38 of which have been identified for decommissioning. The Forest Facility Master Plan is in the process of being updated to reflect consolidation of administrative and land management functions at the field (district) level.

In addition to the administrative structures, as of September 2005, there were 238 other government-owned structures including lookout towers, recreation sites, and dams. Four district ranger offices are leased from private owners; one is leased from General Services Administration; and seven are owned by the Forest Service. All 12 district work centers are Forest Service-owned. Seventeen residential structures range in age from 31 to 70 years. The Ouachita Conservation Center is fully operational with five residences, two offices, three dorms, five training shops, eight storage buildings, a warehouse, canteen, mess hall, laundry, gym, educational building, swimming pool, basketball/tennis court, and dispensary owned by the Ouachita National Forest and operated by the Job Corps.

Two lookout towers, Tall Peak, and Rich Mountain, are managed as recreation sites by the Forest Service. A third tower at Bee Mountain was dismantled, and there are no plans to replace it. A fourth tower at the Tiak Workcenter is maintained by the Forest Service and is being used to house a Forest Service radio repeater. Twenty-seven dams on National Forest System land administered by the Forest Service are classified as follows: three Class C-medium hazard and twenty-four Class D-low hazard. Of PL-566 projects administered by local water improvement districts, nine dams are constructed wholly or partially on Forest land.

Utilities

Currently, there are five major underground pipelines transporting oil and gas and three major overhead powerlines traversing the Forest. These utilities crisscross the Forest without regard to existing transportation corridors or co-location. To minimize future impacts to National Forest System lands from major utility uses, the Forest has designated two multi-facility corridors to maximize co-location of future uses: one corridor is between Norman and Danville, Arkansas, along Arkansas State Highway 27. The other corridor is between Broken Bow and Heavener, Oklahoma, along US Highway 259.

Major utility lines, primarily oil and gas pipelines, large water lines, or power transmission lines, were generally constructed in straight lines between two points to minimize the number of miles of utility line. The way these older existing lines were laid out and constructed fragmented the Forest. The corridors have been difficult to access for continuing maintenance because they do not have road access. Future major utility development will follow existing highway corridors where ever

possible to eliminate the poor access and prevent additional fragmentation by opening a new corridor.

The effects of locating major utility lines within designated corridors may increase initial construction costs for the proponent because the line may be much longer than a utility line constructed in a straight line between points. Locating utilities along highways will widen the highway corridor and may adversely affect the viewshed. Conversely, locating major utilities along the designated corridors should improve access to the utility lines. Better access should result in better maintained utilities at reduced costs. Locating utility lines in the utility corridor will also reduce disruption to wildlife and avoid introduction of invasive species to interior forest areas.

Developed and Dispersed Recreation

National Forests nationwide provide over 191 million acres of public land offering a variety of outdoor recreation opportunities. The Ouachita National Forest in Arkansas and Oklahoma contributes approximately 1.8 million acres to the national total and provides unique settings for activities such as primitive and developed camping, hunting, fishing, hiking, backpacking, horseback and OHV riding, canoeing/kayaking and whitewater rafting, as well as picnicking, sightseeing, nature watching, walking for pleasure, and driving for pleasure. Features on the Forest include wild and scenic rivers, scenic byways, wilderness, the Winding Stair National Recreation Area, and Red Slough Wildlife Area. The 192-miles of the Ouachita National Recreation Trail that lie within the Forest provide a long distance hiking opportunity across the length of the Forest.

Market Area

Market areas have been established for different national forests to better evaluate public demand for recreation opportunities. Past research has demonstrated that most national forest visits originate from within a 75-mile (1½ hour driving time) radius (Overdevest and Cordell 2001). For this analysis, the market area has been defined as all counties that fall within a 75-mile straight-line radius from the Forest boundary.

The market area for the Ouachita National Forest includes portions of five states: Arkansas, Oklahoma, Missouri, Texas, and Louisiana. Larger cities located within the market area include: Tulsa, OK; Shreveport, LA; Little Rock and Ft. Smith, AR; and Springfield, MO.

Adjoining the market area to the north are two additional national forests, the Ozark–St. Francis National Forests (1.2 million acres) and the Mark Twain National Forest (1.4 million acres). Hot Springs National Park and the Buffalo National River also provide opportunities for recreation on federally managed public lands. Corps of Engineer-managed land surrounding several small water impoundments (Blue Mountain Lake and Nimrod Lake) and the large impoundment of Lake Ouachita and Broken Bow Lake provide many opportunities for camping, fishing, boating, swimming, and hunting. In addition, several state parks in and near the Forest provide an outstanding variety of recreational opportunities.

The Forest has completed a comprehensive review of its recreation capabilities and established regions of the Forest best suited to respond to current and potential recreational demands. Figure 3.37 displays the recreation regions.

The following summary describes the recreation opportunities by regions within the Forest:

- The eastern region of the Forest offers premier short hiking and biking trails. It also abounds with opportunities to see and learn about the history of the area. Many sightseers visit this

and the southern region as part of an interwoven experience with other tourist opportunities in the area.

- The southern region features a variety of exceptional water-based recreation including fishing, non-motorized boating, and passive enjoyment of streams, rivers, and lakes. Developed campgrounds provide services for extended stays. Unique botanical, mineral, and prehistoric resources are featured in information and education programs. Hiking and biking enthusiasts enjoy a network of short and long distance trails.
- The northwestern region assists in supplying demand for equestrian uses as access to other large expanses of lands diminish. Developed campgrounds provide services for extended stays to these and other users. Mountaintop scenic drives include wayside stops to learn about the area's rich history.
- The northern region offers opportunities for high quality hunting, wildlife viewing, and remote backcountry experiences. This region also has land characteristics that are well suited for developing carefully focused OHV and horseback riding opportunities managed in an environmentally responsible manner.
- The southwestern region offers opportunities for horseback and OHV riding, high quality stream fishing, and unique birding opportunities.

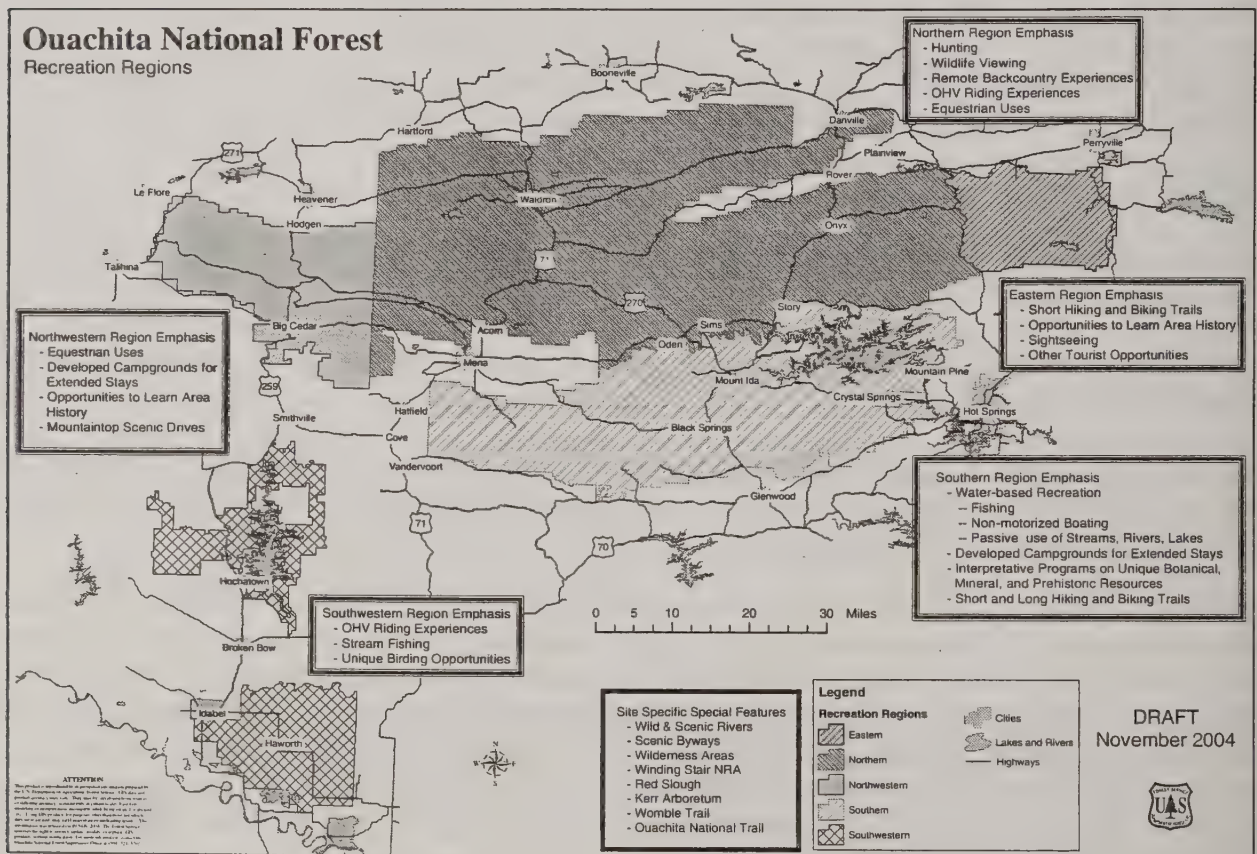


Figure 3.37 Ouachita National Forest Recreation Regions

Recreation Demand and Trends

Recreation demand is a complex mix of people's desires and preferences, availability of time, price, and availability of facilities. The evaluation of current and future demand for recreation on the Ouachita National Forest is based on recent surveys that identify and quantify:

- Estimated number of current recreation visits to the Ouachita National Forest
- Participation rates for recreation activities within the Forest market area
- Future activity demand based on projected trends from research
- Activity demand by demographic strata

The National Visitor Use Monitoring (NVUM) conducted by the Forest Service provides baselines for estimating current use of recreation sites on the Ouachita National Forest as shown in Table 3.100. These numbers only account for people visiting developed or dispersed sites for the purpose of engaging in a recreation activity. They do not include the hundreds of thousands of people who drive through the Forest for other reasons.

Table 3.100 Baselines for Recreation Use on the Ouachita National Forest

Type of Recreation Site	Current Percentage of Total Estimated National Forest Recreation Visits*
Day-Use Developed Sites	13 percent
Overnight-Use Developed Sites	15 percent
Wilderness (Dispersed Sites)	2 percent
General Forest Areas (Dispersed Sites)	70 percent
Total	100 percent (1,536,300 estimated visits)

*Refer to summary of methodology in Appendix B.

Based on this NVUM data, "developed recreation" areas on the Ouachita National Forest accommodate approximately 28 percent of the estimated recreation visits. The remaining 72 percent of recreation visits can be defined as "dispersed recreation," which occurs away from developed sites in general forest areas and designated wilderness.

People within the defined market area for the Forest engage in a variety of recreation activities. Table 3.101 lists the types of activities that can be enjoyed on the Forest and trends in public demand based on the National Survey on Recreation and the Environment (NSRE), an on-going national telephone survey sponsored by the US Forest Service. Data reflects participation in an activity within the defined market area and not necessarily on the Ouachita National Forest.

Table 3.101 Participation Rates and Number of People (x 1,000) over 16 Years Old Participating in Recreation Activities in Ouachita National Forest Market Area and Estimated Percentage Increases through 2050

Recreation Activity	2001 Participation Rate	2000 # of People	2010 (factor) *	2020 (factor)*	2030 (factor)*	2040 (factor)*	2050 (factor)*
Developed Camping	6.8 percent	51.50	(1.27) 65.41	(1.6) 82.4	(1.98) 101.97	(2.44) 125.66	(3.01) 155.02
Primitive Camping	2.0 percent	15.07	(0.98) 14.77	(1.00) 15.07	(1.00) 15.07	(1.05) 15.82	(0.92) 14.77
Picnicking	2.1 percent	16.15	(1.11) 17.93	(1.23) 19.87	(1.37) 22.13	(1.53) 24.71	(1.71) 27.62
Swimming	0.4 percent	3.02	(1.06) 3.20	(1.13) 3.41	(1.20) 3.62	(1.29) 3.90	(1.41) 4.26
Backpacking, Unroaded Camp	1.0 percent	7.21	(1.23) 8.87	(1.57) 11.32	(1.96) 14.13	(2.08) 15.00	(2.71) 19.54
Viewing	19.0 percent	143.48	(1.15)	(1.31)	(1.48)	(1.66)	(1.86)

Recreation Activity	2001 Participation Rate	2000 # of People	2010 (factor) *	2020 (factor)*	2030 (factor)*	2040 (factor)*	2050 (factor)*
Scenery			165.00	187.96	212.35	238.18	266.87
Off-Highway Vehicles	0.3 percent	2.62	(1.05) 2.75	(1.10) 2.88	(1.16) 3.04	(1.23) 3.22	(1.34) 3.51
Driving for Pleasure	9.2 percent	69.45	(1.15) 79.86	(1.31) 90.98	(1.48) 205.20	(1.66) 234.92	(1.89) 267.47
Other Motorized Travel	2.6 percent	19.65	(1.15) 22.60	(1.31) 25.74	(1.48) 29.08	(1.66) 32.62	(1.86) 36.55
Hiking/Walking	12.9 percent	96.31	(1.19) 114.61	(1.38) 132.91	(1.59) 153.13	(1.78) 171.43	(1.94) 186.84
Horseback Riding	0.3 percent	2.62	(1.09) 2.86	(1.19) 3.12	(1.27) 3.33	(1.30) 3.41	(1.31) 3.43
Hunting	4.6 percent	34.72	(0.97) 33.68	(0.93) 32.29	(0.89) 30.90	(0.83) 28.82	(0.76) 26.39
Viewing Wildlife, Birds & Fish	16.1 percent	121.64	(1.21) 147.18	(1.46) 177.59	(1.70) 206.79	(1.89) 229.90	(2.02) 245.71
Fishing	8.8 percent	66.34	(1.09) 72.31	(1.17) 77.62	(1.24) 82.26	(1.26) 83.59	(1.26) 83.59
Wilderness	1.5 percent	11.59	(1.23) 14.26	(1.57) 18.20	(1.96) 22.72	(2.08) 24.11	(2.71) 31.41
Visiting Historical Sites	1.7 percent	13.13	(1.22) 16.02	(1.47) 19.30	(1.77) 23.24	(2.13) 27.97	(2.55) 33.48
Visiting Nature Centers	0.9 percent	6.94	(1.22) 8.47	(1.47) 10.20	(1.77) 12.28	(2.13) 14.78	(2.55) 17.70
General Relaxing	8.0 percent	60.08	(1.11) 66.69	(1.23) 82.43	(1.35) 90.48	(1.49) 99.86	(1.65) 110.58
Gathering Berries, Natural Products	1.6 percent	11.79	(1.11) 13.09	(1.23) 14.50	(1.37) 16.15	(1.53) 18.04	(1.71) 20.16
Nature Study	0.2 percent	1.51	(1.23) 1.86	(1.60) 2.42	(1.98) 2.99	(1.89) 2.86	(2.02) 3.05

*Increase or decrease factors utilize 2001 use data for future projections.

Source: *Ouachita and Ozark National Forest Recreation Realignment Report*, Overdevest and Cordell, 2001 and from *Outdoor Recreation in American Life, A National Assessment of Demand and Supply Trends*, H. Ken Cordell, Principal Investigator, 1999

Demographic information collected within the market area also revealed trends affecting recreation demand. General relaxing, viewing scenery, viewing wildlife, and hiking/walking emerged as the most favored activities across the surveyed demographic groups (Overdevest and Cordell 2001).

Recreation Opportunity Spectrum (ROS)

The ROS is the method used by the Forest Service to inventory and manage outdoor recreation settings and to insure that a broad mix of these settings remain available to provide the recreating public with experiences ranging from high challenge and remoteness (primitive) to more developed and managed settings found in most Forest Service recreation areas (rural). The Ouachita National Forest continues to provide recreation experiences in each category of ROS within the outer limits listed above. However, the majority of the Forest is managed for recreation experiences in the mid-range (Semi-primitive Motorized - SPM), where the forest visitor may enjoy nature in an atmosphere where some challenge and remoteness is available but rarely completely removed from human influence and activity. The ROS changes very little between Alternatives A through E, maintaining

the existing Forest focus on SPM experiences, while sustaining the primitive experiences available in wilderness.

Developed Recreation

A developed site is a distinct place containing a concentration of facilities and services used to provide recreation opportunities to the public. It represents a significant investment in facilities and management under the direction of an administration unit in the National Forest System.

Recreation sites are developed within different outdoor settings to facilitate desired recreational use. Developed recreation sites include such facilities as campgrounds, picnic areas, shooting ranges, swimming beaches, visitor centers, and historic sites. Development levels range from 1 to 5. Level 1 represents the most primitive, natural settings with minimal or no site amenities. Level 5 represents the highest level of development.

The Ouachita National Forest has five Level 5 sites including Camp Clearfork, Cedar Lake Recreation Area, Charlton Recreation Area, Lake Sylvia Recreation Area, and Little Pines Recreation Area; twenty-seven Level 4 sites; sixty Level 3 sites; and forty Level 2 sites. Different levels of development may be present within large campgrounds; however, the designated development level represents at least 70 percent of the facilities.

Supply of Developed Recreation Sites

The Forest Service defines the capacity of developed recreation sites in terms of “people at one time” (PAOTs) that a site can support. Currently, there are 57 significant sites considered as developed sites (there are 132 sites described above by level) managed by the Ouachita National Forest to accommodate different recreation activities. See Appendix B for a description of the NVUM process and discussion of recreation visits by alternatives over time. Table 3.102 displays the current capacities of day-use developed areas as of September 2004 and Table 3.103 shows the current capacities of overnight use developed sites for the same time period.

Table 3.102 Current Capacities of Day-Use Developed Areas

Type of Day Use Developed Areas	Total Number of Areas	Total Capacity (PAOT)
Picnic Areas	11	581
Beaches & Swimming Areas	2	535
Shooting Ranges	11	188
Parking areas, overlooks, historical & minor interpretive sites	7	210
Visitor Centers	2	120
Organization Use Site	2	285
Total Day-Use Capacity	35	1,919

Table 3.103 Current Capacities of Overnight-Use Developed Sites

Level of Campground	Total Number of Campgrounds	Total Capacity (PAOTs)
Level 2	3	100
Level 3	9 (1 horse camp)	570
Level 4	5	1,030
Level 5	5 (1 horse camp)	2,217
Total Overnight Capacity	22	3,917

Overall, developed recreation use on the Ouachita National Forest is increasing. Capacity of Ouachita National Forest recreation sites generally exceeds demand during most periods with the exception of very high use holidays and some weekends during the summer months. This short-term, seasonal, high demand has not been recognized as significant, and no additional developed or dispersed recreational facilities have been designed or constructed to alleviate this condition. Some short-term visitor dissatisfaction due to overcrowding, noise, and space competition is noted. However, adequate facilities are available in other, less well-known and used areas to fill this demand. No significant or lasting resource damage has been attributed to or is expected to occur because of this temporary, but recurring, phenomenon. The Forest plans no significant increase under any alternative to the PAOT of existing developed recreation facilities.

Dispersed Recreation

Dispersed recreation is defined as those activities that occur outside of developed recreation sites such as boating, wildlife watching, sightseeing, hunting, fishing, OHV travel, hiking, and biking. Estimates of recreation visits can be found in Appendix B. There are approximately 100 sites such as trailheads and boat ramps that facilitate dispersed use of the forest. Developed access points for dispersed recreation are shown in Table 3.104.

Table 3.104 Developed Access Points for Dispersed Recreation

Type of Developed Site	Total Number of Sites	Total Capacity (PAOT)
Trailheads	43	675
River Access Points	6	245
Lake Boat Ramps	6	24
Fishing Sites	44	880
Total	99	1,824

In addition to developed access points for dispersed recreation, there are approximately 617 existing miles of designated non-motorized trail for hiking, biking, and horse riding. There are no designated motorized-use only trails on the Forest; however, there are trails including Wolf Pen Gap, Fourche Mountain, and Sugar Creek that are authorized for both motorized and non-motorized uses. Existing miles (September 2004) of non-motorized trail are shown in Table 3.105.

3.105 Miles of Non-Motorized Trails

Type(s) of Non-Motorized Use Allowed	Existing Miles of Designated Trails
Hike only	92
Hike and Bike only	294
Hike and Horse only	24
Hike, Bike, and Horse only	207
Total	617

The 1.8 million acres of Ouachita National Forest offer abundant opportunities for wildlife and fish enthusiasts. The Forest is managed to provide both adequate habitat for the game and non-game species and opportunities for hunting and fishing. Early seral habitat is necessary for forage of many animals, and particularly important for game species such as quail. Streams and lakes are also stocked to provide fishing opportunities. The following tabulation gives the acres of early seral habitat and miles or acres of fish stocking conducted in cooperation with the Arkansas Game and Fish Commission and the Oklahoma Department of Wildlife Conservation:

Early Seral Habitats	465,535 Acres
Stocked (Put & Take) Streams	3 Miles of Stream
Stocked (Put & Take) Lakes	1,160 Acres

Geocaching, a relatively new dispersed recreational activity which utilizes hand-held electronic global positioning units to "hunt" for a previously hidden "cache" (usually a small watertight container with a log book or prize inside), is gaining in popularity throughout the eastern National Forests, including the Ouachita National Forest. If appropriate resource stewardship principles were observed, resource damage because of this activity would be minimal. However, geocaching activities have some potential to increase resource impacts because of increases in use of primitive and semi-primitive areas and depending upon the methods and locations used for hiding the cache.

Concentrated overnight camping and day use in riparian corridor areas adjacent to the Little Missouri Wild and Scenic River have begun to cause degradation of these areas through soil compaction, erosion, proliferation of fire pits and rings, and damage to existing vegetation. Surveys have been conducted to determine the amount and type of use taking place in this area and to assist in determining the most appropriate solutions to restore and protect these areas.

Off-Highway Vehicle Use

Off-highway vehicles include all classes of motorized vehicles that are capable of traveling off hardened surfaces, such as 4-wheel drive vehicles (jeeps, automobiles, or sport utility vehicles), motorcycles, and all-terrain vehicles (ATVs). Collectively, such vehicles are known as off-highway vehicles or OHVs. Although OHVs are owned and used for many reasons, this discussion addresses only off-highway recreational use of OHVs within the Ouachita National Forest.

The 1990 Amended Forest Plan treats public use of off-highway vehicles (OHVs) on the Ouachita National Forest as suitable except where expressly prohibited, such as in wilderness areas, the forest floor of the Broken Bow unit, and the "wild" portion of the Little Missouri Wild and Scenic River. During scoping for plan revision, the practice of allowing cross-country OHV travel on the Ouachita National Forest was identified as an issue.

In 2004, the Chief of the Forest Service identified unmanaged recreation as one of the top four threats to the health of National Forest System land and resources. The Chief commissioned the National OHV Policy and Implementation Teams, who identified a number of undesirable impacts on National Forest System lands from unmanaged OHV use, including:

- user-created unplanned roads and trails
- severely eroded soils
- damaged wetlands and harm to wetland species
- habitat destruction
- degraded water quality
- the spread of invasive species—plants, animals, and disease-causing pathogens
- user conflicts
- destruction of cultural sites
- disturbance to sites sacred to Native Americans

OHVs provide an opportunity for the public to explore public lands, and use on the Forest has increased in keeping with the popularity of this recreational activity in other parts of the country. Nationally, the total number of vehicles estimated to be in use grew from just under three million in 1993 to over eight million in 2003, with industry reports confirming the sale of over one million such vehicles in 2003 alone (Cordell 2005). Based on regional exit surveys from national forests in Puerto Rico and the states of Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Texas, and Virginia, OHV use (primary and secondary) represents about 4 percent of the total recreational visits for the region, but over two times that rate (9.2 percent) on the Ouachita National Forest (English 2004). Those same surveys reported that, nationally, OHV use represents 5.6 percent of total national forest visits.

In actual numbers, about 152,000 incidents of OHV use occur on the Ouachita National Forest annually. Here, the use of OHVs for family outings, retrieval of big game, access to and set-up of hunting camps, and general recreational use has been allowed on designated trails and open roads as well as on the forest floor (cross-country) with few restrictions. Over time, such use has become a culturally accepted and expected form of recreation by many citizens living within or near the Forest, especially those involved in deer hunting and, to a lesser extent, turkey and bear hunting. The Forest has also become a major destination for general recreational use of OHVs, drawing people primarily from Arkansas, Louisiana, Oklahoma, and Texas.

The Forest conducted six open house meetings during the fall of 2003 and visited with nearly 500 citizens to solicit and receive comments about potential changes to OHV management direction and about their preferences for OHV use within the Forest. A strong preference to continue allowing retrieval of big game was expressed by many who participated in these meetings.

Concentrated use of OHVs in some geographic areas has resulted in resource damage and conflicts with other users as well as adjacent landowners and has become an important topic of public and agency concern. With the growing popularity of such vehicles in the United States and the Forest, a change in existing management direction for use of these vehicles is needed.

ALTERNATIVES

Alternative A (No Action Alternative)

Current ROS distributions would not be expected to vary from description provided in the Affected Environment. Developed and dispersed recreation opportunities including associated scenery management would continue to be provided under the guidance of the 1990 Forest Plan. No

changes to existing recreation management would be made. Public access (travel ways, use corridors, waterways, and trails) would be managed at current levels for recreation opportunities.

Alternative B

Recreation opportunities and development would remain the same as in Alternative A; however, cross-country travel by motorized vehicles would be considered unsuitable requiring that a system of designated routes be developed with appropriate public input. Recreation opportunities found under Alternative B would continue to be provided at their current levels.

Alternative C

A variety of recreation settings and opportunities would occur in areas where these activities would be compatible with ecosystem health and community safety. Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input.

Alternative D

Additional Primitive (ROS – P) recreational opportunities would be provided through the recommendation of additional areas for inclusion into the National Wilderness System and the addition of smaller parcels of land to existing wilderness areas. Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input. Cross-country travel for big game retrieval would be a suitable use.

Alternative E (Selected Alternative)

A variety of recreation settings and opportunities would occur in areas where these activities would be compatible with ecosystem health and community safety. Cross-country travel by motorized vehicles would be considered unsuitable, and a system of designated routes would need to be developed with appropriate public input.

Direct, Indirect, and Cumulative Effects on Recreation

Capacity for the Forest's developed recreation areas, with the exception of short-term peak use mostly during holidays, is currently adequate and projected to remain adequate for at least the duration of the next planning cycle. However, with limited capacity, some sites experiencing increased overuse and crowding at peak times such as holidays and weekends may lower visitor satisfaction. Use would reach capacity more often over time and some visitor's expectations would not be met. When compared to Alternative A, Alternatives B, C, D, and E would have no increases or decreases in existing developed recreation areas.

Alternatives differ little in terms of their effects on non-motorized trails. Alternative D, for example, could lead to the elimination of mountain biking on about 14 miles of trail that pass through a recommended wilderness area (if Congress were to designate this area as a wilderness). Information gathered during the 2000 NVUM studies indicates that the Forest's trail system is currently adequate to meet hiking, biking, and horseback riding demand and will continue to be able to meet anticipated increases in demand for these activities over the upcoming planning period.

Cross-country horse trail use would be considered suitable in most locations on the Forest under all alternatives. The effects of this activity include resource impacts when a user-created trail develops.

Satisfaction of some users is greater if horseback riders are allowed off-trail where there is a sense of freedom. However, other forest visitor's satisfaction is decreased when resource impacts from these cross-country horse users affect their experience. At this time, there are no plans to increase equestrian-only trail miles or to construct additional horse camps.

According to the Wilderness Act of 1964, allocation of lands to wilderness affects all mechanical and motorized transport forms of recreation. Since any additional allocation to wilderness status for this planning cycle is anticipated to be relatively small, the resultant impacts will remain minor. Even the 30,127 acres considered for wilderness recommendation under Alternative D would have relatively minor effects as the terrain is rugged and ample other opportunities exist for mountain biking in other locations on the Forest.

Variations in OHV management direction by alternative are displayed below. Alternative A contains the management direction (suitability) for public use of off-highway vehicles (OHVs) on the Ouachita National Forest in the 1990 Amended Forest Plan, and therefore, would present no change. Under the 1990 Forest Plan, drivers may not operate OHVs in designated wilderness areas, developed recreation areas (MA 3), Research Natural Areas and National Natural Landmarks (MA 4), the Ouachita Seed Orchard (MA 7), or any other area posted closed to cross-country traffic by motorized vehicle. All alternatives have these restrictions in common. Differences are listed in the tabulation below.

Alternative	Comparison of OHV Direction
A	Cross-country travel suitable unless posted closed and on open roads (those not barricaded or posted closed) and designated trails
B	Cross-country travel unsuitable
C	Cross-country travel unsuitable
D	Cross-country travel unsuitable, except for large game retrieval
E	Cross-country travel unsuitable

Alternatives C, D, and E contain recommendations for additional acres to be designated as wilderness. Alternatives C and E recommend an additional 1,793 acres (as wilderness additions), and Alternative D recommends these additions plus an additional 30,127 acres in three new areas for wilderness designation. Under Alternatives C, D, and E, the additional acreage recommended for wilderness designation would be removed from areas where trails or roads could be designated for OHVs as those acreages would be managed as a part of MA 1, Wilderness, where OHVs are prohibited.

Alternatives A and D would allow retrieval of large game. Alternative A would allow game retrieval because cross-country travel would be a suitable use; under Alternative D, such cross-country travel for game retrieval would be a specific exception. This exception for game retrieval would not be included in Alternatives B, C, or E, which would likely have a marked effect on hunting access and hunter attitudes toward the National Forest.

Table 3.106 displays estimates of potential game populations by alternative. Alternative E emphasizes hunting, fishing, and non-consumptive wildlife opportunities. Effects of this emphasis will include increased opportunities for hunting, fishing, and non-consumptive wildlife viewing on some parts of the Forest because of increased vegetation management and management for recreation purposes. This will increase user satisfaction for visitors in some areas. Effects on hunters of small and big game will generally be positive. Some specific areas on the Forest will not be managed for game species that were managed in the past; this will affect hunters more negatively by decreasing the places or the success ratio. Some areas would be managed differently than in the past, and hunter satisfaction may increase in those areas. Hunting decreases the satisfaction of some other users, especially trail users, due to safety concerns. Effects may include

a decrease in use on certain trails during the hunting season to avoid safety hazards. The quantity of stocked (put and take) streams and reservoirs is expected to change over alternatives.

Table 3.106 Estimates of Potential Game Populations by Alternative

Type of Game Habitat	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Deer per square mile	12.8	13.2	22.7	13.4	13.7
Northern bobwhite per square mile	35.2	29.1	42.7	37.8	36.6
Eastern Wild Turkey per square mile	3.4	2.7	5.9	3.2	3.3
Early Successional Habitat ¹ (1,000 acres)	57.00	60.00	60.00	57.00	57.00

¹Early successional habitat includes total acres in the grass/forb/shrub condition forest-wide.

Under all alternatives except Alternative A, public use of OHVs would continue to be suitable on routes and in areas where such use is not prohibited, but it is anticipated that the Forest would move toward a system of designated trails and roads for public use of OHVs and other motorized vehicles within four years. Designation of such a system may require additional environmental analysis (with public involvement). Under all alternatives, routes posted closed or closed to vehicle use by a gate, earthen barrier (berm), or other obvious means, and areas posted closed to cross-country travel by motorized vehicle (e.g., wilderness, walk-in turkey hunting areas during certain seasons, portions of wild and scenic river corridors) would not be available for public use of OHVs. The Forest Supervisor may issue new prohibitions that close additional areas to OHV travel during the transition period between the 1990 Forest Plan management direction and adoption of a system of designated routes.

For purposes of this analysis, it is assumed that user-defined trails would continue to be created under all alternatives, although at varying intensities. Because user-defined trails are not carefully chosen and designed after study of variables such as soils, topography, proximity to streams, sensitive habitats, or cultural sites, and season of use, there is a high likelihood that greater impacts to soil, water resources, vegetation, wildlife and wildlife habitat, cultural sites, and users on user-defined routes will occur than on routes that are established following careful consideration of these variables and professional design work.

Although there is an assumption that some user-defined trails would continue to develop, there is also an expectation that such development would diminish under all alternatives as the public becomes aware of the damage such trails cause. Alternatives B, C, D, and E should result in fewer user-defined trails, due primarily to education through publication of designated routes, interaction with law enforcement officers and other officials, and an expectation that the majority of OHV drivers are law-abiding citizens. After a period of adjustment during which the public becomes familiar with the new direction for use of OHVs and begins to adhere to the established policies, Alternatives B, C, D, and E would show further decreases in creation of user defined trails and the

associated problems of erosion, water degradation, habitat destruction, damage to cultural sites, and conflicts between users.

Under all alternatives, there would be a continuing need for law enforcement. Under Alternatives B, C, D, and E, once the designated routes are in place, it is anticipated that some OHV users would continue to travel cross-country, taxing law enforcement resources. Enforcement of OHV use on designated routes may divert time away from other law enforcement duties. Over time, violations and effects to Forest Law Enforcement resources would be expected to diminish as the public becomes more familiar with the OHV restriction and published information receives wider distribution. An undetermined adjustment period would be necessary.

OHV use has both direct and indirect effects on vegetation: direct effects include crushing and uprooting of plants, and indirect effects include soil compaction and other soil modifications that may reduce opportunities for restoration of plant cover (Wilshire, Shipley, and Nakata 1978). Forest areas that are rutted from OHV use and littered with damaged vegetation are not only unsightly, they are representative of adverse impacts to the long-term productivity of the land.

Many studies have been conducted on the impacts of OHVs on many different types of soil. Schubert and Associates (1999) reported that the U.S. Geological Survey reviewed the impact of OHVs on more than 500 soils from more than 200 sites in various climatic zones and with different vegetative cover and concluded that virtually all soil types examined are vulnerable to OHV damage. Most studies of problems associated with soil disturbance caused by OHVs list the following as problems:

- rutting and associated root disturbances
- destabilization of the soil base and decreased soil aggregate stability
- disturbance and loosening that increases susceptibility to wind and water erosion
- nutrient depletion due to loss of topsoil
- formation of surface crusts, increasing runoff
- lower soil moisture and higher soil density that inhibits germination and emergence of seedlings
- reduced water infiltration and increased sediment transportation and deposition
- degraded and destroyed habitat for plants and soil dwelling animals

While riding on designated trails and roads poses inherent environmental risks, these risks intensify when riders travel off trails and roads, because previously undisturbed areas are impacted. Because OHV use is increasing, the number of riders who ride off designated routes is also likely to increase. This percentage, however small, creates additional environmental impacts. More studies are needed to quantify the amount and extent of soil loss attributable to OHV use. Alternative A does not contain provisions to decrease the number of drivers who ride off-route. Alternatives B, C, and E would provide direction for no off-route driving, and Alternative D would have the same no off-route riding restrictions with the exception for game retrieval.

Limited information is available about air quality impacts from OHVs. Stokowski and LaPointe in "Environmental and Social Effects of ATVs and ORVs: An Annotated Bibliography and Research Assessment" state, "The few published air quality studies related to ATV uses tend to be limited to research focusing on snowmobile operation. Some internet sources also discuss air quality, though the internet-publicized research is primarily supported by interest groups. In general, there seems to be a noticeable lack of research about levels and effects of ATV emission." According to Kasnitz and Maschke (citing California Air Resources Board 1996:7), "One two-stroke off-road motorcycle or all-terrain vehicle emits as much hydrocarbon pollution per mile as 118 passenger cars, while relatively cleaner four-stroke engines still emit more than seven times the level of carbon monoxide

as new cars." Because a policy of limiting OHVs to designated trails and roads is not expected to decrease the number of OHV users within the Forest, all alternatives would be considered to be equal in terms of air quality effects.

One observable soil disturbance as a result of OHV riding is stripped vegetation cover. Soil that is not stabilized is likely to erode faster during rainfall/runoff events, be more susceptible to wind erosion, and is more easily loosened by additional OHV traffic. Disturbed soil particles that are air borne eventually settle out and this contamination works its way into nearby waterways contributing to degraded water quality through sediment deposit (Smith 1999).

In research conducted on four stream basins within the Ouachita National Forest (Chin and others 2004), four findings were made:

- pools downstream of OHV crossings were muddy and sediment laden
- sands and fines are substantially higher in stream pools within basins affected by OHVs
- quantitative data for embeddedness (spaces around rocks in the streambed) did not show clear differences between OHV affected and non-affected streams
- OHV affected streams were not as deep as were reference streams

Activities that contribute to increased soil erosion, such as cross-country OHV riding, will continue to contribute to degraded water quality and aquatic habitat. A shift to designated trails and roads could positively influence water quality in proportion to the quantity of OHV traffic shifted off the forest floor and onto designated routes.

Bury (1980) reported that OHV crossings in streams destroyed aquatic plants and disrupted the habitat of invertebrates, fish, amphibian, some reptiles, and some birds. Riparian habitat is particularly susceptible because damage that leads to increased sedimentation has the potential to alter entire ecosystems. Refer to the discussions concerning aquatic habitat and species elsewhere in this document for lists of sensitive species that could be affected.

While habitat disturbance is fairly easy to detect and understand, a less well-researched impact, effects of noise, is also of concern. Noise from OHVs disturbs wildlife and may cause them to relocate (Bury 1980). Displacement of species that are dependent upon a limited habitat has the potential to affect their long-term viability if a sufficient quantity of suitable habitat is not available and species are forced to survive and reproduce in marginal or unsuitable habitat (Schubert and Smith 2000). As in humans, noise may cause hearing impairment and loss. Lack of hearing disables creatures exposing them to increased predation and increased difficulty in locating prey. Within their species, hearing impairment may lead to inability to recognize mating signals, warning calls, and calls by juveniles (EPA 1971).

The network of user-defined trails that unrestricted OHV use often produces has the effect of fragmenting wildlife habitat. The presence of humans in areas previously unused or lightly used causes disturbance. During vulnerable seasons, such as breeding or nesting season, human disturbance may cause nest abandonment, decline in parental care, shortened feeding time, and increased stress (MacArthur 1982). Some species mortality is directly attributable to collisions with OHVs. Bury (1980) found that mortality was greatest among ground nesting birds and rodents.

A system of designated routes (such as might be developed under Alternatives B through D) would offer the advantage of careful consideration during the planning and design phase and fragile habitats could be avoided. After the trails and roads were designated, wildlife species could establish feeding and breeding routines that would not be unexpectedly interrupted. By limiting

stream crossings to designated points, a system of designated routes would greatly reduce damage to aquatic habitat and water quality.

One unintentional consequence of driving OHVs off-route is that soil and some vegetative matter lodges in the tires of the OHVs and is transported into other areas. Such inadvertent transport of materials may allow the spread of invasive species and disease-causing pathogens. Although more research is needed to quantify the actual risk posed by off-route riding, it is reasonable to conclude that alternatives that include provisions to limit off-route driving have the greatest potential to reduce the spread of invasive species.

OHVs are a very popular use within the Ouachita National Forest; however, the Forest is also used for other types of recreation. There are nine Walk-In Turkey areas on the Forest and a number of other areas that offer a semi-primitive recreation experience. Turkeys are particularly sensitive to the effects of noise; therefore, introduction of OHVs into areas on user-defined trails is detrimental to the recreational users who enjoy turkey hunting. Other recreational users seek time in the Forest for solitude. Introduction of OHVs into areas where there are people seeking a semi-primitive experience is detrimental to their enjoyment.

As discussed above, user defined trails cause damage to the forest floor, and those damages cost money to repair. Diversion of funds from other programs to repair unnecessary damage conflicts with other programs and deflects time and money away from those programs. Restricting use to designated routes would help to eliminate damage from user-defined trails.

The closure of unrestricted cross-country travel would serve to protect cultural properties across a broad landscape. When OHVs leave designated routes and create user-defined trails, no analysis to determine if historic or cultural properties would be damaged has been undertaken. Thousands of identified cultural sites exist within the Forest. Disturbance by OHVs to cultural sites as well as sites sacred to Native Americans is an unacceptable practice. If a system of designated routes was established, all known sites could be avoided.

According to Cordell (2005), "Federal agencies such as the Bureau of Land Management and the US Forest Service provide the majority of opportunities for OHV use and the demand for such use is growing rapidly in the face of limited other opportunities." Allowing cross-country travel and the unrestricted development of user-defined routes have many negative impacts; however, the resulting trails allow OHV users to experience new experiences and settings. The Ouachita National Forest is one of the few large areas of public land where OHV use is permitted.

While there is a great demand for places for people to enjoy their OHVs, the potential for conflicts is increasing as use increases. There are conflicts among users and conflicts with private landowners (inholders and adjacent landowners). User conflicts, such as those experienced when some hunters and hikers encounter OHV riders, are increasing as demands for OHV access increase. Among OHV riders, some prefer to have routes or areas to themselves, and their satisfaction is decreased when large numbers of OHV riders spoil their experience.

Because places where people may ride OHVs are limited and the Forest provides an easily accessible venue for such activity, large numbers of people travel from neighboring states to use the Forest. After the DEIS was circulated for comments, the Forest received many comments from persons in several states concerned about their access to the Forest for OHV riding. Among the communications was a letter from an officer with the Arkansas Game and Fish Commission that noted, "These people ARE NOT going to stop riding their ATV's in the forest and no amount of laws or regulations can or will stop them. We need to allow it and control it through enforcement." Law enforcement officers for the Forest report that illegal use of alcohol is prevalent and there is, in general, a lack of concern or awareness about environmental damage, with a particular lack of

understanding about the damage caused to riparian habitat. Yet, many OHV users express a desire to protect and enjoy the natural environment.

People who own land within and near the Forest have reported that OHV users often trespass onto their property, leave trash, are noisy late into the night, abuse alcohol, and are belligerent when confronted. Forest inholders expect to enjoy solitude when they live in areas surrounded by the Forest, not long-lasting intrusive sounds and actions by others. They report that tire ruts and trash left by OHV users impair the natural beauty of the Forest. A management direction that makes cross-country travel unsuitable should help to avoid some of these conflicts.

Within the Forest and within the Southern Region as a whole, higher rates of hunting and fishing were reported than for other regions (English 2004). During public involvement in the OHV use issue and during the comment period for the DEIS, many people asked questions about access for hunters and disabled persons. As a result of these concerns, cross-country access for retrieval of large game animals would be an exception under Alternative D. Because access for game retrieval would be limited to deer and bear hunting seasons only, such access would not have the same detrimental effect on the environment as year-round cross-country access. With regard to access for persons with disabilities, the agency already has an established policy: if a road or area is closed to the able-bodied, it is also closed to the disabled individual. Both the Arkansas Game and Fish Commission (AGFC) and the Oklahoma Department of Wildlife Conservation (ODWC) allow access to state managed areas for disabled persons if certain qualifications are met. Because the AGFC and ODWC are the primary agencies for regulating hunting, the US Forest Service cooperates fully with them to enforce regulations relating to hunting.

The Forest is one of the last available areas open to the general public to ride OHVs. Limiting cross-country travel by motorized vehicles has the potential to sustain the opportunity to enjoy OHV recreation over a longer period of time than direction that allows unmanaged cross-country travel. With designated routes, the Forest would have the opportunity to create routes that are logical and well connected. A system that allows OHVs to be driven on designated routes would preserve opportunities for access. Access for short periods of time, such as for game retrieval (Alternative D), would not likely cause irreparable damage; however such an exception would show favoritism to one group and still has the potential for damage to the Forest that would cost money to repair. Land is a nonexpandable resource and must be protected. A Forest direction to guide the use of OHVs and a system of designated routes could minimize or eliminate the undesirable impacts from unmanaged OHV use. Improved management of OHVs with the Forest would allow the Forest Service to protect the resources of the Forest and ensure that high-quality motorized recreation experiences are provided to the public.

Other sections of the FEIS address additional recreation environmental consequences related to Scenery, Wild and Scenic Rivers, Wilderness, Roadless Areas, Special Areas, and Heritage Resources.

Commodity and Commercial Uses

Timber

The Multiple-Use Sustained Yield Act of 1960 recognizes timber as one of the five major resources for which national forests are to be managed. National Forest timber resources are managed to provide wood products for the use of the citizens of the United States, provide an even flow of timber to help local economic stability, provide for regeneration of tree stands, and maintain diversity of forest vegetation.

The 1982 planning regulations define timber production as “the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. The term timber production does not include production of fuel wood (36 CFR 219.3). National Forest System lands which are considered ‘suitable’ for timber production are the basis for setting the quantity of timber that may be sold from the Forest. This quantity is usually expressed on an annual basis as the “average annual allowable sale quantity (ASQ).”

Lands considered unsuitable for timber production include those:

- that are administratively withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service
- that are not producing or capable of producing crops of industrial wood (such as bodies of water, roads, administrative sites, and lands that produce less than 20 cubic feet per acre per year)
- where technology is not available to prevent irreversible assurance that lands can be adequately restocked within five years after final harvest, based on existing technology and knowledge, as reflected in current research and experience
- where there is, at present, inadequate information concerning responses to timber management activities
- where timber management is inconsistent with, or not cost efficient in meeting the management requirements and multiple-use objectives specified in each alternative

Management Areas

Nine of the 17 Management Areas (MAs) are entirely unsuitable for timber production in all alternatives. These MAs considered wholly unsuitable for timber production include:

- MA 1. Wilderness and Poteau Mountain
- MA 3. Developed Recreation Areas
- MA 4. Research Natural Areas and National Natural Landmarks
- MA 5. Experimental Forests
- MA 6. Rare Upland Communities
- MA 7. Ouachita Seed Orchard
- MA 8. Administrative Sites/Special Uses
- MA 9. Water and Riparian Communities
- MA 20. Wild and Scenic River Corridors

The eight remaining MAs contain a mix of lands both suitable and unsuitable for timber production:

- MA 2. Special Interest Areas
- MA 14. Ouachita Mountains, Habitat Diversity Emphasis
- MA 15. West Gulf Coastal Plain, Habitat Diversity Emphasis
- MA 16. Lands Surrounding Lake Ouachita and Broken Bow Lake
- MA 17. Semi-Primitive Areas
- MA 19. Winding Stair Mountain NRA
- MA 21. Old Growth Restoration
- MA 22. Renewal of the Shortleaf Pine/Bluestem Grass and RCW Habitat

Community Types

Of the community types represented within the eight Management Areas that contain land suitable for timber production, the potential for timber production is mainly from the pine-oak forests and woodlands. The pine-oak community type consists of four sub-types: Ouachita pine-oak forest;

Ouachita pine-oak woodland; Ouachita shortleaf pine-bluestem, and West Gulf Coastal Plain pine-oak forest. These community types and the portion of the Forest they represent are shown in the following tabulation.

Community Type	Percent of Total Forest
Pine-Oak Forest	50.00
Pine-Oak Woodland	16.60
Shortleaf Pine/Bluestem	3.60
West Gulf Coastal Plain Pine-Oak	0.40
Total (Pine-Oak)	70.60

Forest Land Tentatively Suitable for Timber Production

The tentatively suitable lands (36 CFR 219.14) are displayed in Table 3.107, by alternative. Suitable acres (total Forest acres as of April 2003) for the Forest vary from the base in Alternative A to a slight decrease in Alternative B and are decreased by 1,793 acres (Flatside, Poteau Mountain, and Upper Kiamichi Wilderness additions) in Alternatives C and E. Under Alternative D, new recommended Wilderness would result in a reduction of 30,127 acres to lands classified as suitable for timber production. Areas not capable of timber production were classified as "Physically Incapable" and removed from the tentatively suitable classification. Areas such as water or land developed as roads and administrative or recreation sites were classified as "Non-Forest" and not considered suitable for timber production. Other areas where timber resource production was determined not to be compatible with meeting other resource objectives were classified as "Not Appropriate." This would include the acres in the following Management Areas, plus active RCW clusters:

- MA 2. Special Interest Areas
- MA 3. Developed Recreation Areas
- MA 4. Research Natural Areas and National Natural Landmarks
- MA 5. Experimental Forests
- MA 6. Rare Upland Communities
- MA 7. Ouachita Seed Orchard
- MA 8. Administrative Sites/Special Uses
- MA 9. Water and Riparian Communities
- MA 20. Wild and Scenic River Corridors

Table 3.107 Suitability Classification by Alternative

Classification	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Total Land	1,780,101	1,780,101	1,780,101	1,780,101	1,780,101
Non-Forest	-31,283	-31,283	-31,283	-31,283	-31,283
Withdrawn	-104,218	-104,218	-104,218	-104,218	-104,218
Physically Incapable	-5,479	-5,479	-5,479	-5,479	-5,479
Tentatively Suitable	1,639,121	1,639,121	1,639,121	1,639,121	1,639,121
Not Appropriate	-622,893	-622,893	-622,893	-622,893	-622,893
Recommended Wilderness	0	0	-1,793	-30,127	-1,793
Recommended Botanical Area	0	0	0	0	-1,673
Suitable Acres	1,019,694	1,019,694	1,017,901	989,567	1,016,228

Timber Production on the Ouachita National Forest

Although the Ouachita National Forest contains a wide variety of tree species, timber products are grouped and sold as either pine or hardwood. Pine sawtimber and small roundwood (pulpwood and posts) include both shortleaf and loblolly pine. Pine sawtimber is pine timber 9.6 inches and larger in diameter at breast height (DBH) or 4.5 feet from the ground. Pine roundwood is all pine timber from 5 to 9.5 inches DBH.

Table 3.108 shows sold volumes for fiscal years (FY) 1994 to 2003. Annual total timber volume sold declined 55 percent from 1994 to 2003. The unusually low volume sold in 2002 is due to recovery from an ice storm event in December 2000. Sawtimber volume sold decreased approximately 43 percent when FY 2003 is compared to FY 1994.

Table 3.108 Total Timber Volume Sold, 1994-2003 in Hundred Cubic Feet (CCF)

Fiscal Year	Sawtimber	Roundwood (pulpwood and posts)	Total (CCF)
1994	153,164.60	94,948.18	248,112.78
1995	183,609.75	90,013.00	273,622.75
1996	185,861.62	58,181.24	244,042.86
1997	136,350.53	42,709.47	179,060.00
1998	198,721.04	61,154.03	259,875.07
1999	94,333.69	35,838.83	130,172.52
2000	140,550.12	65,909.55	206,459.67
2001	158,722.96	31,824.87	190,547.83
2002	31,992.18	2,191.12	34,183.30
2003	86,628.31	24,235.58	110,863.89

Table 3.109 shows the acres harvested from 1994 to 2003 by type of treatment or cutting method. Uncontrollable events such as the December 2000 ice storm have the potential to influence greatly the acres in need of harvest for salvage purposes.

Table 3.109 Acres by Cutting Method by Year

Year	Clearcut	Seedtree	Shelter-wood	Uneven-Aged	Thinning	Salvage	Total
	Acres						
1994	17 ¹	1,307	1,047	11,715	14,152	0	28,238
1995	0	403	1,114	8,742	14,312	2,277	26,848
1996	0	752	1,057	9,033	12,474	1,517	24,833
1997	0	1,156 ²	-	9,348	13,919	1,474	25,897
1998	0	2,509 ²	-	7,674	23,684	288	34,155
1999	0	1,805 ²	-	5,677	9,810	1,075	18,367
2000	0	1,838 ²	-	2,857	16,706	18	21,419
2001	0	937 ²	-	1,157	5,984	46,294	54,372
2002	0	460 ²	-	1,334	5,873	1,566	9,233
2003	0	2,068 ²	-	2,760	12,073	118	17,019

¹Clearcut for Research

²Seedtree and Shelterwood reported together

Hardwood sawtimber and small roundwood include all the various hardwood species, primarily oaks and hickories. During the ten-year period FY 1994–2003, hardwood was sold primarily for fuelwood purposes and was made available during site preparation activities after pine timber had been harvested. During this period, an average of 857 hundred cubic feet (CCF) of fuelwood was harvested per year.

The average value of all Forest products sold during FY 2003 was \$143.42 per thousand board feet (MBF) for sawtimber and \$7.09 per hundred cubic feet (CCF) for pulpwood. The total value of FY 2003 timber cut was \$10,331,013.42. Total value of timber sold in FY 2003 was \$7,010,818.62.

During the ten-year period FY 1994–2003, timber sales yielded almost 147 million cubic feet (MMCF) or 810 million board feet (MMBF) of sawtimber and more than 59 million cubic feet (MMCF) of small roundwood products (pulpwood and posts). Between 1995 and 2002, standing timber inventories of growing stock increased from 1,171 cubic feet/acre to 1,410 cubic feet/acre, an increase of 239 cubic feet/acre.

During the ten-year period FY 1994–2003, the Forest averaged slightly more than 109 timber sales per year, with an average of 73 sales per year individually valued at more than \$10,000. The sale program for FY 2003 included 491 sales, of which, 32 sold for more than \$10,000 individually. Currently, 57 percent of the Forest's sawtimber sale program is designated for sale to purchasers classified by the Small Business Administration as "small business." Forest timber receipts have grown from 32 dollars in 1909 to 10.3 million dollars in 2003.

National Timber Supply and Demand

According to the 2000 Renewable Resources Timber Assessment:

- Consumption of forest products will continue to increase over the next 50 years, but the rate of increase will be slower than over the last 50 years. Rising consumption will be accompanied by increases in U.S. timber harvest; rising log, chip, and product imports; and greater use of recovered paper.
- The composition of both production and consumption will change. Pulp and paper products will account for a larger share, the relative importance of composite products will remain steady, and the importance of lumber will decline.
- The projected prices of sawtimber in the South are a notable exception to the overall projection of moderate price increases: prices are projected to rise as a result of limited availability.
- Over the next 50 years, most of the increase in the Nation's timber harvest will occur in the East and especially on non-industrial lands in the South.
- United States timber harvest is expected to increase 24 percent by 2050; harvest of softwoods will increase 30 percent and harvest of hardwoods will increase by 17 percent. Most of the increase will be used for manufacturing paper, paperboard, and composite products.
- Plantations for softwood species will play an important role in future domestic harvest expansion. By 2050, 54 percent of total U.S. softwood growing stock removals will come from plantations in private ownership.
- Timber inventories will increase over the next 50 years. Softwood timber inventories will rise on all ownerships in all regions by 53 percent for the U.S. as a whole; softwood inventories on public lands alone will rise by more than 70 percent. Hardwood inventories will increase by 27 percent.
- Over the next 50 years, the species composition of U.S. forests will shift toward softwoods in the South and toward hardwoods in the North, but remain largely unchanged in other regions.
- By 2050, the age structure of forests managed on an even-aged basis will be similar to current conditions on private lands but shift toward older age classes on public lands.

- Harvests on national forests decreased from 2.0 billion cubic feet in 1991 to 0.8 billion cubic feet in 1997 and are projected to remain near the 1997 harvest level over the next 50 years.
- Although domestic production will continue to account for most of the U.S. consumption, the share of total consumption met by imports will rise from 20 percent today to 26 percent by 2050.

Regional Timber Supply and Demand

The Ozark-Ouachita Highlands Assessment (USDA FS 1999d) identified favorable growth/removal ratios for the region's softwoods. With an increase in the softwood inventory, harvest is expected to increase faster in the Highlands relative to other areas of the South. By 2020, the scale of softwood harvests in the Highlands is projected to be nearly double that of 1990 levels, and higher than the projected 33 percent increase in the South. Even with the increased removal, softwood inventories will continue to rise.

Local Timber Supply and Demand

Timber supply is the relationship between the quantity of timber that landowners will offer and price. Timber demand is the relationship between the quantity demanded by wood product manufacturers and price. The interaction of supply and demand defines timber markets. Softwood sawtimber is used in the manufacture of dimension lumber, timbers, poles, and plywood. Hardwood sawtimber is not a large market for the Forest. Softwood and hardwood pulpwood and low quality timber are primarily used to make paper, packaging material, and composite panels.

Timber from the Forest is primarily processed at local sawmills, plywood plants, and paper mills in Arkansas and Oklahoma. These mills have an annual capacity for softwood sawtimber alone of over 1,454,546 hundred cubic feet (ccf). Demand for timber in the local area far exceeds what has been supplied by the Ouachita National Forest historically and will continue to do so under all alternatives.

As an indicator of demand, the Forest sells almost all of the timber that is offered. Less than one percent of the volume offered does not sell. Sales not sold are primarily for salvage material.

In a report published by Bentley and others (2002), softwood sawtimber production declined 4.4 percent, and softwood pulpwood production increased 328.9 percent from 1996-1999 for the Ouachita region of Arkansas. This report also showed that within the nine Arkansas counties in which the Forest Service owns over 5 percent of the land, softwood sawtimber production was 541,910 ccf, and softwood pulpwood production was 245,020 ccf in 1999.

In counties with National Forest System lands, National Forest land comprises from less than one percent of forested county acreage to 77 percent of the forested county acreage. In seven counties with Forest lands, the Forest occupies over 25 percent of the forested acreage and in two counties, Montgomery (76 percent) and Scott (77 percent), the Forest occupies over three-fourths of the forested acreage. Table 3.110 displays the forested acres by county and the acres of National Forest System land within each county, and provides an indication of the importance of National Forest System land to supplying demand for timber products based on the percent of National Forest System land within each county. While National Forest acres are not 100 percent forested, data to determine the forested acres of National Forest ownership by county are not readily available; therefore, all acres are assumed to be forested.

Table 3.110 Forested Acres and Acres of National Forest Land by County

County and State	Acres in County	Forested Acres in County	ONF Acres and % of Forested Acres in County
Ashley, AR	589,717	387,077	1,675 <1%
Garland, AR	433,998	347,478	119,715 34%
Hot Springs, AR	393,608	298,170	320 <1%
Howard, AR	375,990	266,594	1,531 <1%
Logan, AR	454,293	300,981	18,586 6%
Montgomery, AR	499,756	439,596	334,400 76%
Perry, AR	352,584	290,624	99,170 34%
Pike, AR	385,972	323,047	10,365 3%
Polk, AR	550,013	426,664	206,356 48%
Saline, AR	463,787	374,126	58,959 16%
Scott, AR	572,088	479,064	369,619 77%
Sebastian, AR	343,316	185,658	18,956 10%
Yell, AR	593,892	426,648	188,817 44%
LeFlore, OK	1,014,248	674,788	221,356 33%
McCurtain, OK	1,168,921	850,931	132,840 16%

Direct and Indirect Effects

Land suitable for timber production, long-term sustained yield capacity (LTSY), and allowable sale quantity (ASQ) were considered in evaluating the effects of implementing the alternatives on the forest product resource. LTSY is defined as "the highest uniform wood yield from lands being managed for timber production that may be sustained under a specified intensity of management consistent with multiple use objectives" (36 CFR 219.3). The Forest long-term sustained yield capacity under each alternative is shown in Table 3.111.

Table 3.111 Long Term Sustained Yield by Alternative

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Long Term Sustained Yield (MMCF per year)	50.0	57.8	73.7	63.2	69.3

SPECTRUM, a linear program-based forest planning model used to optimize land allocation and activity and output scheduling over a specified planning horizon, was used to calculate LTSY. The

model utilized period-by-period outcomes, including changes in vegetation growth stage, acres treated, and timber harvest volumes to derive the LTSY estimates above and ASQ volumes. Data provided to the model included the allocation of acres of land to a management area; identification of suitable lands for timber management; current vegetation conditions; and the identification of vegetation treatments and associated management objectives for each alternative.

ASQ is the maximum quantity of timber that may be sold from the land suitable for timber production for a period specified by the Forest Plan. The average annual ASQ for the first decade for each alternative is displayed in 3.112.

Table 3.112 Allowable Sale Quantity (ASQ) by Alternative

	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Average Annual ASQ (MMCF)	26.2	26.2	33.0	25.0	27.0

Estimated harvest acres for each alternative are shown in 3.113 for suitable lands. All alternatives have fewer acres allocated to uneven-aged harvest than Alternative A. Alternative C, with the greatest focus on forest health, has higher acreages allotted to thinning when compared to other alternatives. Alternatives D and E have higher acreages projected to be thinned than Alternative A. All alternatives may also have additional harvesting due to unplanned management activities, such as salvage, on both suitable and unsuitable lands.

Table 3.113 Timber Harvest Acres (x 1,000) by Alternative and Cutting for 10- and 50-Year Periods

Treatment	A		B		C		D		E	
	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year	10 Year	50 Year
Uneven Aged	250	250	110	110	100	100	200	200	125	125
Thinning	262	408	174	366	517	690	277	461	285	407
Even-Aged Regen.	57	81	60	95	60	124	57	129	57	118

Table 3.114 shows the estimated annual revenue, costs, and net revenue of the timber program for each alternative for the first ten-year period. The costs shown are the direct costs associated with the timber sale program (sale preparation, administration, and stand establishment with associated treatments). The net revenue is the difference between revenues and costs. Alternative E is the alternative with the greatest net revenue during the first ten-year period.

Table 3.114 Projected Average Annual Timber Program Revenue, Costs, and Net Revenue for the First 10-Year Period, in Millions of Dollars

Measure	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Revenue	24.3	22.9	24.9	23.5	24.4
Costs	18.3	16.4	23.1	18.0	17.6
Net Revenue	6.0	6.5	1.8	5.5	6.8

All of the alternatives have positive net revenues for all periods. Table 3.115 contains a summary comparison of alternatives, and other differences are discussed in the following narratives. Alternative C has the highest LTSY and the lowest net revenue at the ten-year period. Alternative C also has the highest ASQ. Alternative E has the second highest LTSY and the greatest net revenue at both the ten-year and 50-year period.

Table 3.115 Summary Comparison of Alternatives for Timber-Related Measures

Measure	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Suitable acres	1,019,694	1,019,694	1,017,901	989,567	1,016,228
LTSY (MMCF)	50.0	57.8	73.7	63.2	69.3
Annual ASQ (MMCF) 1 st 10-Yr Period	26.2	26.2	33.0	25.0	27.0
Net Revenue \$ Million 1 st 10-Yr Period	6.0	6.5	1.8	5.5	6.8
Net Revenue \$ Million 5 th 10-Yr Period	17.2	18.9	20.5	21.8	23.4

Cumulative Effects

The cumulative ecological and social effects from timber harvest activity by alternative are covered in other sections of this chapter. Timber harvest is considered along with other management activities as they pertain to the resource under consideration.

Table 3.116 displays Allowable Sale Quantity (ASQ), Long Term Sustained Yield Capacity (LTSY), and total acres projected to be harvested annually.

Table 3.116 Measures of Cumulative Timber Effects

Measure	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Annual ASQ (MMCF) 1 st 10-Yr Period	26.2	26.2	33.0	25.0	27.0
LTSY (MMCF)	50.0	57.8	73.7	63.2	69.3
Annual Acres Harvested 1 st 10-Yr Period	56,900	34,400	67,700	53,400	46,700
Annual Acres Harvested 5 th 10-Yr Period	79,600	65,400	100,400	86,300	74,600

ASQ ranges from a high of 33.0 Million Cubic Feet (MMCF) for Alternative C to a low of 25.0 MMCF for Alternative D. LTSY ranges from a low of 50.0 MMCF to a high of 73.7 MMCF. This is reflective of the changes presumed to occur over time as alternatives are continued.

Acres harvested represent a combination of uneven-aged harvest, commercial thinning, and even-aged regeneration harvest. The level of uneven-aged harvest is determined by the acres allocated to that method in the first 10-year period and does not vary over time. Acres allocated to uneven-aged harvest range from 250,000 in Alternative A to 100,000 acres in Alternative C. This represents a range of 25,000 acres to 10,000 acres harvested annually. Harvested acres may vary over time depending upon the existing stand conditions and the intensity of stand management. Thus, over time, as more stands are in a condition to support repeated thinnings, the number of acres thinned increases. Likewise, over time, as more stands are in a condition where they are suitable for regeneration, the number of acres regenerated increases.

Alternative C represents the most intensive vegetation management to create a healthy forest condition. As a result, more acres are harvested, and current and future allowed volume levels are the highest.

While Alternative E would have the second highest ASQ and LTSY, harvest activities would be focused on that portion of the Forest that could most efficiently support them. As a result, fewer acres are treated more intensively to maintain current harvest levels while ensuring increased future capacity.

While Alternative A (No Action) and Alternative B have the same ASQ, their primary difference is in the amount of acres allocated to uneven-aged harvest. By treating an additional 140,000 acres with thinning and even-aged regeneration harvesting, Alternative B ultimately attains a higher level of allowed future harvest while impacting fewer acres annually.

Alternative D combines a high allocation to uneven-aged harvest with more intensive thinning and even-aged regeneration in areas identified for their ecological and wildlife habitat potential. Therefore, some of these areas do not have the highest timber production potential. Thus, while ultimately allowing a moderate level of future harvest, Alternative D treats more acreage with a lower yield capacity.

Minerals

The majority of the lands on the Ouachita National Forest were acquired through land purchase or exchange. In some instances, mineral rights were outstanding, that is, rights were held by a third party at the time the Forest Service purchased the land from the surface owner; and in other cases, the landowner reserved the minerals as a condition of sale or exchange. As a result, the United States has varying degrees of control over surface operations related to mineral extraction, depending on the mineral ownership. There are about 1,780,457 acres of surface estate owned by the federal government and administered by the Ouachita National Forest. About 701,000 acres, 39 percent of the National Forest have Public Domain (PD) surface and mineral status. These are lands that have never been conveyed out of federal ownership, and were later reserved for national forest purposes. The U.S. acquired, through purchase or exchange, the remaining 1,079,457 acres, or 61 percent of the National Forest.

Total federal mineral ownership under the federal surface estate is 1,485,245 acres, which is about 84 percent of the Forest area. There are 295,212 acres of federal surface within the Forest that are subject to privately owned mineral interests. This comprises about 16 percent of the forest area. Of this, 82,021 acres (about 5 percent of the federal surface) are subject to 100 percent private mineral ownership. The mineral interests under the remaining 213,191 acres of federal surface (about 11 percent of the forest) are split between federal and private ownership, with the U.S. owning some fractional mineral interest under these 213,191 acres.

Minerals activities on the Ouachita National Forest are primarily associated with hardrock minerals exploration and production, and gas exploration. Minerals and gas potentials are not affected by the Forest Plan alternatives; however, alternatives can affect access to and exploration of the mineral estate. Gas and hardrock minerals potential for all Ranger Districts is displayed in Table 3.117. The geologic table for the Geologic Formations on each of the Ouachita National Forest Ranger Districts is displayed in Table F.1 in Appendix F. The geologic descriptions are also found in Appendix F. The USDI Bureau of Land Management (BLM) has provided the evaluation on the gas development for the Ouachita National Forest titled "Oil and Gas Reasonable Foreseeable Development Scenario" in Appendix F.

Table 3.117 Minerals Potential for the Ouachita National Forest

Ranger District	Formations ¹ (% of total formations on each Ranger District)	Minerals Potential			
		Quartz	Other Hardrock ²	Gas ³	Coal Bed Methane
Choctaw	Pa 90% PMS/Pj/Pjv/Phs 10%	Low	Low	Med to Med-High	Med to Med-High
Caddo	Ms 40%, Mda 15%, Ob 15%, Ow 15%, Oc 5% Pj/Smb/Ocm/Obp 10%	High	High	Low	Low
Cold Springs	North of Highway 80: Pau 35%, Pam 15%, Pma 15%, Phs 5%, Psv 30%	Low	Low	Med	Med-Low
	South of Highway 80: Pal 95%, Pam 5%	Low	Low	Low	Low
Fourche	North of Highway 28: Pal/Pam 75%, Pau 25%	Low	Low	Med	Med-Low
	South of Highway 28: Pal/Pam 95%, Pjv/Pj 5%	Low	Low	Med	Low
Jessieville	MS 25%, Pal 3%, Pj 30%, Pjv 15% (North 2/3 from Highway 298)	High	Med	Low	Low
	Ob 7% Ow 10%, Om 5%, Mda/Smb/Obf/Obp 5% (South 1/3 from Hwy 298)	High	Med	Low	Low
Kiamichi	Pj 60%, Pjv 5%, Pa 20%, Pms 15%	Med	Med	Med	Low
Mena	North of Mena, AR: Pj 50%, Pjv 10%, Ms 20%, Pal 20%:	Med	Med	Low	Low
	South of Mena, AR: Ms 50%, Mda 25%, Smb 15%, Obp 10%	Med	Med	Low	Low
Oden	Pam/Pal 30%, Pj 30% Obp/Smb 5%, Ms 30%, Pjv 5%	High	Med	Low	Low
Poteau	North of Poteau River: Phs 10%, Pau 10% Pma/Psv 80%	Low	Low	Med	High
	South of Poteau River: Pal/Pam 90% Pjv/Pj 10%	Low	Low	Med	Low
Womble	Ow 15%, Mda 5%, Oc 15%, Ocm 20%, Ob 0%, Om 15%, Ms/Obp/Smb 20%	High	High	Low	Low
Winona	Pj 50%, Ms 15%, Pal/Pam 30%, Pjv/Mda/Ow/Obp 5%	High	Med	Low	Low
Tiak	Idabel area: Qt/Qal 45%, Kto 40%, Kk 7%, Kw 7%, Ka/Kgw/Kbr 1%	Low	Low	Med	Low
	Broken Bow area: Mst 55%, Sb 30%, MDSa 8%, Pjf/Ob/Op/Obf/Ow/ Oc/Sm/Kh/Qal 7%	Low	Low	Med	Low

¹ Geologic formations occurring on each Ouachita National Forest Ranger District and approximate percent of the Ranger District comprised by each formation within it.

² Hardrock: refers to metallic and valuable non-metallic subsurface minerals, but not sand, gravel, and stone (Common Variety Mineral Materials) considered part of the surface estate.

³ Gas: Exploration Potential and Production from USDI Bureau of Land Management, Jackson District Office, Energy Minerals Department.

Lands Statutorily Unavailable For Mineral Leasing or Permit

1. Subject to valid existing rights, the minerals in lands designated under the Eastern Wilderness Act of 1975 and subsequent wilderness acts for Arkansas (1984) and Oklahoma (1988) are statutorily withdrawn from all forms of disposition under all laws pertaining to mining and mineral leasing. The Ouachita National Forest has six congressionally designated wildernesses, statutorily withdrawn from mining and leasing: Black Fork Mountain, Caney Creek, Dry Creek, Flatside, Poteau Mountain, and Upper Kiamichi for a total of approximately 64,469 acres: therefore, there are no issued federal mineral leases or permits within these designated areas.
2. Subject to valid existing rights, rivers congressionally designated a "Wild River" in federal land ownership are withdrawn from mineral production including the bed or bank or lands situated within ¼ mile of the bank. This restriction does not apply to those segments of a Wild and Scenic River that are designated as "scenic" or "recreational." The Ouachita National Forest has two congressionally designated rivers and one river recommended for designation. Currently, only one segment on the Little Missouri River is a congressionally designated "Wild" river segment. Table 3.118 lists the congressionally designated Wild and Scenic Rivers on the Ouachita National Forest.

Table 3.118 Listed (Congressionally designated) Rivers on the Ouachita National Forest

Arkansas Rivers	Wild Segment	Scenic Segment	Recreational Segment
Little Missouri River, Segments I and III	4.4 miles	11.3 miles	--
Cossatot River, Segments A and B	--	6.9 miles	4.2 miles
Brushy Creek Tributary to Cossatot, Segment C	--	4.4 miles	--
Total Listed	4.4 miles	22.6 miles	4.2 miles

Table 3.119 contains rivers that have not been designated, but are recognized under Alternatives C, D, and E as having qualities that would make them eligible. Thus, the potential exists for these river segments to be designated in the future.

A 16.5-mile segment of the Glover River with 15.5 miles of National Forest System lands would be recommended for designation under Alternatives C, D, and E.

Table 3.119 Rivers Eligible for Further Study as Wild and Scenic Rivers

Arkansas Rivers	Wild Segment	Scenic Segment	Recreational Segment
Ouachita River	--	15.3 miles	35.6 miles
N. Fork of Saline River	--	3.8 miles	6.0 miles
Mid Fork of Saline	--	---	3.2 miles
Caddo River	--	--	25.2 miles
Alum Fork of Saline	--	3.9 miles	--
Little Missouri			2.3 miles
Oklahoma Rivers			
Mountain Fork River	--	9.1 miles	--
Glover River	--	15.5 miles	--

Federal Minerals Management

Legal and Administrative Framework

Statutory and regulatory direction separates mineral resources in the publicly owned lands of the United States into three categories: locatable, leasable, and salable. Forest Service policy governing the exploration and development of mineral activities on National Forest System lands is guided by statutes, regulations, and Executive Orders. Statutory and regulatory direction for mineral resources on the Ouachita National Forest can be found in Appendix F.

Locatable Minerals

The General Mining Law of 1872 applies to all mineral deposits in National Forest System lands reserved from the public domain. A review of mineral withdrawals was conducted to determine if withdrawals on the Ouachita National Forest should remain in effect or be recommended for removal. The USDI Bureau of Land Management is the lead Federal agency for monitoring and managing administrative mineral withdrawals. The withdrawals do not affect leasable energy and common variety disposals unless so stated in the withdrawal authority. The mineral withdrawal review is in Appendix F.

Minerals, such as metallic minerals, that would be locatable minerals on public domain lands are hardrock leasable minerals on acquired lands. The Ouachita National Forest is currently working with an exploration operation on one mining claim (see Table 3.120), and locatable minerals issues with a group of four mining claims. Since 1990, primary issues with mining claims on the Ouachita National Forest involved working with quartz mining claimants to voluntarily relinquish their mining claims and convert into the quartz contract program (salable minerals). Over 500 mining claims were voluntarily relinquished between 1989 and 1994.

Table 3.120 Mining Claim Cases on the Ouachita National Forest (September 2004)

Case	Location	Type	Impact Acres
ESMC-12131	T1N R28W Sec.8 (Poteau/Cold Springs RD)	Mining Claim	0.1
ESMC-10673-676	T3S R24W Sec 20 (Caddo RD)	Mining Claim	0.0

Leasable Minerals

There are two types of leasable minerals: non-energy hardrock minerals and energy (oil, gas, coal) minerals. Leasable "hardrock" minerals interests on the Ouachita National Forest include five leases for quartz crystal, one lease for wavellite, and two prospecting permits for wavellite on the Womble, Caddo, and Jessieville Ranger Districts. Only three of the leases are in production, and mining is intermittent. All are small scale, family-run operations. Each of these three are approximately five to six acres in size. Of the remaining three leases, one has been idle for 30 years (no surface impact), one is undergoing a re-exploration phase (several exploration trenches within a ½ acre area), and the third is about to commence reclamation on five impacted acres. The two prospecting permits are located within an aggregate pit used primarily for aggregate for county roads.

Non-energy (Hardrock) Leasable Minerals

On acquired lands, the exploration and development of hardrock minerals, such as gold and silver, is authorized by a federal prospecting permit or preference right lease issued by the Bureau of Land Management (BLM), Department of Interior. As of September 2004, the Forest has six non-energy (hardrock) leases (five for quartz crystal and one for wavellite) and two prospecting permits (both for wavellite) issued by the USDI Bureau of Land Management. Table 3.121 contains a list of hardrock leasable cases on the Forest.

A party desiring a prospecting permit makes an application to the appropriate BLM office. Based on the review of the Forest Plan and NEPA analysis, the Regional Forester either consents or denies consent to issuance of the prospecting permit by the BLM. Hardrock prospecting permits have an initial term of two years with the option of a four-year renewal.

If the BLM believes the deposit can be mined, milled, and sold at a net profit, they will request Forest Service consent to issuance of a 20-year preference right lease. Even though valuable deposits of minerals may be found, the Forest Service could deny consent to issuance of the preference right lease based on the environmental analysis and other factors.

For non-energy leasable minerals, public scoping and a site-specific analysis are completed by the Forest Service upon the BLM's receipt of a permit or preference right lease application. This is done prior to issuance of the permit or lease. BLM cannot issue a permit or lease on hardrock leasable minerals without the consent of the Regional Forester.

Table 3.121 Hardrock Leasable Cases on the Ouachita National Forest

Case	Location	Mineral Commodity	Impact Acres
Womble RD			
ES-8092	T2S R25W Sec. 34	Quartz Crystal	5.00
ES-35436	T2S R26W Sec. 1	Quartz Crystal	0.25
ES-36143	T2S R26W Sec. 22	Quartz Crystal	4.00
ES-36588	T3S R24W Sec. 4	Quartz Crystal	5.00
ES-50206	T2S R25W Sec. 3	Wavellite PP	0.10
ES-51144	T2S R25W Sec. 3	Wavellite PP	0.10
Caddo RD			
ES-35118	T3S R24W Sec. 9 & 10	Quartz Crystal	5.00
Jessieville/Winona RD			
ES-08	T1S R22W Sec. 11	Wavellite	0.10

Energy Leasable Minerals (Oil and Gas, Coal)

Through the passage of the 1920 Mineral Leasing Act, Congress established a program to provide for oil and gas and coal development on federal lands, including the National Forests reserved from the public domain. This Act authorizes the Secretary of the Interior to issue leases for removal of certain minerals (including coal, phosphate, sodium, potassium, oil, oil shale, gilsonite, and gas). The Mineral Leasing Act for Acquired Lands of August 7, 1947, extends the provisions of the mineral leasing laws to acquired National Forest System lands and requires the consent of the Secretary of Agriculture prior to leasing. The National Forest System lands on the Ouachita National Forest are 61 percent acquired lands. Deposits of coal can only be mined by underground methods. There are no known deposits of mineable coal on the Forest.

In accordance with the Energy Security Act of 1980, energy leases and permits will continue to be processed notwithstanding the current status of the revision of the Ouachita National Forest, Forest Plan. The implementing regulations for the Onshore Oil and Gas Leasing Reform Act of 1987, (36 CFR 228, Subpart E) provide the basis for the analysis of alternatives and decisions on federal oil and gas leasing.

The Minerals Management Service (MMS) of the Department of Interior collects all minerals revenues generated from federal leases and permits. The MMS distributes 25 percent of the energy mineral revenues generated from acquired lands to the State of Arkansas under the authority of Public Law (PL) 60-136, 25 Percent Fund Act of 1908; in addition, the non-energy mineral receipts are distributed by the Forest Service under one of two public laws: 1) PL 60-136, 25 Percent Fund Act of 1908, or 2) PL 106-393, Secure Rural School and Community Self-Determination Act of 2000, depending on the election made by each county. In those cases where the leases involve public domain minerals, 50 percent of the mineral revenues are distributed by the MMS to the State of Arkansas.

The Forest Plan may make two decisions related to minerals: 1) availability of lands for future leasing (36 CFR 228.102(d)), and 2) consent to lease the available lands (36 CFR 228.102(e)), subject to standard lease terms, or subject to additional constraints (stipulations) as required by the prescription for a specific management area. Those areas of the Forest with leasing interest or mineral potential are analyzed using the "Reasonable Foreseeable Development Scenario" developed by the BLM (Appendix F). This study looked at the long-term (10 years) potential for oil and gas development in the study area and projected the number of wells that could be drilled during the 10-year period. Under all alternatives, including the Selected Alternative, Alternative E, the BLM will be able to issue oil and gas leases in areas where the Plan makes both the availability and the consent decision. The environmental analysis and documentation for federal oil and gas is more detailed than it is for other leasable minerals because of the two oil and gas lease decisions, which are carried forward to the Revised Forest Plan after analysis.

Federal oil and gas leases contain standard lease terms (SLTs) which provide that the operations must be conducted in a manner that minimizes, to the extent possible, adverse impacts to the land, air, and water; to cultural, biological, and visual and other resources; and to other land uses or users. Federal environmental protection laws such as the Clean Air Act, Clean Water Act, Endangered Species Act, and Historic Preservation Act apply to all proposed activities.

In addition, based on the management prescription for a specific area contained in the Forest Plan, the lease may have been issued subject to a stipulation that modifies the standard lease rights. Conditions, or restrictions in the stipulations, are considered consistent with the lease rights granted, provided that they do not require relocation of proposed operations by more than 200 meters, require that the operations be sited off the leasehold, or prohibit new surface disturbing operations for a period in excess of 60 days in any lease year.

There are three different nationally approved stipulation forms:

- No surface occupancy (NSO) – Used when surface occupancy of certain lands is prohibited.
- Timing/season – Used to prohibit surface occupancy of certain lands during specific times, such as for protection during nesting season.
- Controlled surface use (CSU) – Used when restrictions will apply to occupancy, such as requiring additional mitigation to resolve potential conflicting uses, or to meet visual quality objectives.

A lease may also be issued subject to a lease notice (LN). A notice does not contain any new restrictions. It simply puts the lessee on "notice" that his operations must be in compliance with the applicable statute(s), such as the Endangered Species Act, if applicable at the time surface occupancy is proposed.

In addition to the two lease stipulations that may be required, there are two LNs that can be used:

- LN #3, which indicates all, or part, of the leased lands may contain animal or plant species classified under the Endangered Species Act.
- LN #4, which indicates all, or part, of the leased lands may be classified as wetlands, floodplain, or riparian areas that will require special protection.

Lessees may request modification waivers, or one-time exception of an NSO stipulation, or any other stipulation, and the Forest Service may authorize the BLM to grant the change if: 1) the change is consistent with Federal law and the Forest Plan, 2) management objectives which led to the stipulation can be met following the change, and 3) the environmental impact of the change is acceptable.

In all cases where the minerals are privately owned, the Forest Service must obtain the best surface protection possible using the terms of the deed severing the subsurface from the surface estate, applicable Secretary Rules and Regulations and other state and federal laws (i.e. Endangered Species Act), and cooperation and negotiations with the operator.

Gas on the Ouachita National Forest

The first gas production on the Forest commenced from a single coal bed methane gas well on the Poteau Ranger District in Yell County in 2004 (T4N R32W, with an impact area of approximately one-half acre). The coal bed methane is associated with a known coal deposit being mined on private lands several miles north of the Forest boundary. Coal bed methane well life is projected at five to 10 years. The well currently produces approximately 200,000 mcf.

Gas Pipelines on the Ouachita National Forest

Gas pipelines (referred to as "flowlines" for oil), are essential and unique to the transport needs of the energy minerals that are produced. The Forest has permitted gas pipelines constructed in the one-fourth mile access road to the coal bed methane operation near Hartford, Arkansas, and in the one-half mile segment on the Forest adjacent to a county highway.

Salable Mineral Materials

The Mineral Materials Act of July 31, 1947, as amended by the Multiple Use Mining Act of July 23, 1955, authorized the disposal of mineral and vegetative materials and defined common variety mineral materials. Common varieties of mineral materials (CVMM) include aggregate, landscaping rock, riprap, flagstone, and other earthen construction materials. Mineral materials are not federal leasable minerals. Under this Act, they can be sold to individuals or companies through negotiated or competitive bidding or given as free use to public agencies (e.g., county and state highway departments) for public purpose use. Any sale of mineral materials must be made at no less than fair market value. Sale of mineral materials is at the discretion of the Forest District Ranger.

Common Variety Mineral Materials on the Ouachita National Forest

The CVMM program is administered by the Forest Service for disposals of quartz in Arkansas, and pit run gravel (aggregate) and building stone in Arkansas and Oklahoma. In 2003, the Forest issued 44 contracts and permits for CVMM disposals of aggregate and surface collected building stone totaling 161,696 tons valued at \$101,000. CVMM removals take place at 22 dispersed sites on 67 acres (average 3 acres per site) across the Forest. The main aggregate pit on the Forest is 17 acres in size operated primarily by Montgomery County in Arkansas for county road and public building projects, and is the largest minerals operation on the Ouachita National Forest.

The primary CVMM pits and building stone sites and their respective sizes are listed in Table 3.122.

Table 3.122 Common Variety Mineral Material Locations and Sizes on the Forest

Case	Location	Impact Acres
Designated Aggregate (Gravel) Pit Sites:		
Womble RD		
Mauldin (County)	T2SR25W Sec 3 E	10.00
Mauldin	T2SR25W Sec 3 W	7.00
Crystal Springs (County)	T2S R22W Sec 33 S	6.70
Crystal Springs (COE and Public)	T2S R22W Sec 33 E	6.70
Caddo RD		
Meyers Creek	T3S R22W Sec.16	2.50
Pigeon Roost	T4S R23W Sec.14	4.50
Rattlesnake	T4S R24W Sec.4&5	5.00
C-58	T4S R25W Sec.15	4.00
Blocker Creek	T4S R27W Sec.36	4.00
C-74 Polk Cr.	T4S R26W Sec.8	2.00
Buck Branch	T5S R27W Sec.16	0.50
C-76	T4S R256W Sec.19	0.50
Jessieville/Winona RD		
Blue Jay Hollow	T3N R17W Sec.22	2.00
Poteau/Cold Springs RD		
Franklin	T2N R28W Sec.35	0.25
Hinkle Southside	T2N R31W Sec.10	0.25
Poteau Mtn.	T3N R32W Sec.5	2.00
Bruton	T2N R29W Sec.33	0.25
Reelfoot Ranch	T2N R30W Sec.12	0.50
Pilot Mtn.	T4N R29W Sec.24	2.00
Jack Creek	T4N R27W Sec.4	2.00
Oklahoma RDs - McCurtain County		
Two ponds	T2S R25E Sec 11	2.00
Cedar Creek	T4S R23E Sec 27	2.00
Designated Building Stone Site:		
Oden RD		
Hackberry Mtn.	T1S R26W Sec.1&2	3.00

In 1988, Congress passed legislation directing that quartz minerals “salable” minerals be administered by the Forest Service. There are 27 quartz crystal contracts and one novaculite contract currently on the Forest in Arkansas. These are all located on the Womble, Caddo, Oden, Jessieville, and Winona Ranger Districts and are displayed in Table 3.123.

Table 3.123 Quartz Common Variety Minerals in Arkansas

Case	Location	Mineral Commodity	Impact Acres
Womble RD			
OQC-20	T2S R25W Sec. 35	Quartz Crystal	0.25
OQC-69	T2S R25W Sec. 34	Quartz Crystal	0.10
OQC-117	T3S R23W Sec. 3	Quartz Crystal	0.10
OQC-212	T3S R25W Sec. 12	Quartz Crystal	2.50
OQC-213	T3S R25W Sec. 12	Quartz Crystal	2.50
OQC-230	T2S R23W Sec. 36	Quartz Crystal	0.25
OQC-236	T2S R26W Sec. 16	Quartz Crystal	2.00
OQC-241	T3S R24W Sec. 11&12	Quartz Crystal	3.00
OQC-243	T2S R25W Sec. 35	Quartz Crystal	2.00
OQC-265R	T3S R24W Sec. 8	Quartz Crystal	2.00
OQC-266R	T3S R24W Sec. 3	Quartz Crystal	2.00
OQC-268R	T2S R23W Sec. 36	Quartz Crystal	2.00
Caddo RD			
OQC-01	T3S R24W Sec. 9	Quartz Crystal	5.00
OQC-166	T3S R24W Sec. 3	Quartz Crystal	0.10
OQC-227	T3S R24W Sec. 21	Quartz Crystal	0.10
OQC-231	T4S R26W Sec. 31	Novaculite	2.00
OQC-263	T3S R24W Sec. 10	Quartz Crystal	2.00
Oden RD			
OQC-251	T1S R24W Sec. 22	Quartz Crystal	2.50
OQC-252	T1S R24W Sec. 22	Quartz Crystal	2.50
Jessieville/Winona RD			
OQC-114	T2N R17W Sec. 18	Quartz Crystal	0.10
OQC-205	T2N R17W Sec. 17	Quartz Crystal	0.10
OQC-160	T2N R20W Sec. 26	Quartz Crystal	2.00
OQC-179	T2N R18W Sec. 8	Quartz Crystal	4.00
OQC-232	T1S R21W Sec. 11&12	Quartz Crystal	1.00
OQC-240	T2N R18W Sec. 8	Quartz Crystal	0.10
OQC-250	T1S R24W Sec. 12	Quartz Crystal	4.00
OQC-261	T1N R20W Sec. 12	Quartz Crystal	0.50
OQC-262	T1N R20W Sec. 12	Quartz Crystal	0.50

Quartz minerals, aggregate, and building stone operations are relatively small scale mining operations impacting from one-tenth of an acre to 6 acres. Quartz operations average 1.2 acres in size. Existing pits for aggregate average 2.8 acres in size. Building stone surface removals impact average one-tenth acre (these are hand removal of loose surface stone requiring no excavations or surface disturbance).

On the Forest, occasional removal of small amounts of material by hand from surface exposures of rock for personal purposes (rockhounding) is considered a reasonable recreational pursuit as long

as no resource damage occurs and no hazards are created in the undertaking. Panning in Forest streams is permitted as a hobby interest primarily to hone panning skills in preparation for serious gold panning pursuits in other states (economic gold deposits are not noted in the Ouachita Mountains). Panning can only occur in the bed of the stream (not the bank), using only the edge of the pan or a small trowel to loosen gravels, and material retrieved can only be for personal use. No hazards or significant disturbances can be created from this activity. Groups interested in pursuing an organized recreational rock collecting and/or panning activity must submit their proposal in writing to the local District Ranger for consideration. Any such activity approved by the District Ranger may require the submission of a reclamation bond. The Forest receives several requests per month regarding rockhounding and panning.

Rockhounding on quartz crystal contracts requires approval by the District Ranger and includes specific safety requirements for the public. Three quartz contracts are operated solely for rockhounding. Five contracts for commercial quartz crystal also allow the public to rockhound under stringent safety conditions required by the Forest Service.

Direct, Indirect, and Cumulative Effects

Locatable Minerals

There have been no development or production operations for locatable minerals in the Forest Planning period from 1990. Since 1988, when Congress changed the status of quartz minerals on the Ouachita National Forest in Arkansas from locatable minerals to salable minerals, the Forest has only worked with exploration proposals on mining claims. If this trend continues, there are no known direct or indirect effects from the proposed activities on the locatable minerals.

Leasable Minerals/Non-Energy

There are no differences between Alternatives A, B, C, and E regarding Leasable Minerals. Alternative D differs because it would recommend an additional 30,127 acres for wilderness, and minerals activity would not be permitted in wilderness. Of the six permits for non-energy leasable minerals, only three are in production and mining is intermittent. All are small scale, family-run operations. Each of these three is approximately five to six acres in size. Of the remaining three leases, one has been idle for 30 years (no surface impact), one is undergoing a re-exploration phase (several exploration trenches within a ½ acre area), and the third is about to commence reclamation on five impacted acres. The two prospecting permits are located within an aggregate pit used primarily for aggregate for county roads. Exploration and possible future mining impacts are fully contained within the existing pit. Because this type of activity is generally confined to small areas, is on a declining trend, and is subject to stringent standards through the Forest Plan, it is not expected that any alternative would have an effect on the leasable non-energy minerals.

Leasable Minerals/Energy

Projections for coal bed methane indicate that additional wells are likely to be drilled in the area of the coal bed in the area of Hartford, Arkansas. Advanced drilling technology currently being employed in the Hartford area indicates that multiple drill holes can be drilled from a minimal number of well pad sites to access coal bed methane. The BLM's reasonable foreseeable development scenario (see Appendix F) for oil and gas is a model or projection of possible oil and gas exploration and/or development activity (leasing, exploration, development, production, and abandonment) in a defined area for a specified period of time (usually 10 years). The scenario is based primarily on the subsurface geology, past development history, current activity, and anticipated future demand with consideration of other significant factors, such as economics, technology, physical limitations on access, existing or anticipated infrastructure, and transportation.

It is divided into a forecast primarily for the Poteau, Cold Springs, and Fourche Ranger Districts in Arkansas, and Kiamichi and Choctaw Ranger Districts in Oklahoma, where most of the exploration interest has taken place on the Ouachita National Forest.

The Arkoma Basin just north of the Forest has a high potential for gas reserves. It is anticipated that gas production from coal bed methane will reduce significantly in the next five years as the methane trapped from the coal seam is removed. Aside from the economic benefit, removal of coal bed methane significantly reduces the possibility of hazards from that gas in the coal seam area.

From 1990 to 2003, only three gas wells were drilled, and all were dry. In 2004, drilling for coal bed methane in the northwestern part of the Forest commenced. Coal mining is taking place on private lands several miles north of the Forest. The nature of the coal deposit is such that it is not anticipated that coal mining will occur on the Forest (at least not so in the next planning period). However, it is likely that additional wells for gas will be drilled. In fact, a proposal for six wells is currently under review. Coal bed methane wells typically produce for only five to 10 years before being fully reclaimed. It is anticipated that coal bed methane interest in the area will have been fully evaluated within the next five years. Average impact is three acres per well pad; two acres per well pad for new access road. Given a low, medium, and high scenario, the Table 3.124 displays the likely impacts from drilling for gas.

Table 3.124 Area Disturbed from Gas Drilling

Number of Wells	Area Disturbed from Drilling (Acres)		
	Well Pads	Access Roads	Total
Low 16	48	32	80
Medium 66	198	132	330
High 132	396	484	880

According to BLM, the low scenario more closely reflects drilling scenarios for the Ouachita National Forest. It is assumed that all wells would be drilled within ten years. Therefore, surface disturbance associated with exploration would be spread out over ten years at an average of one to two wells (1.6) per year. The total acreage disturbed will be approximately 80 acres total or an average of eight acres per year. The bulk of these acres are reclaimed immediately after cessation of drilling operations. Well pads for dry wells are fully reclaimed, along with their associated access road. Well pads for producing wells are reclaimed also except for one-half acre needed for surface production equipment. Access roads to producing wells are partially reclaimed to the minimum width needed for support equipment to surface production equipment. Flow or pipelines will follow access roads with the occasional exception of cross-country routing when necessary. Pipelines are immediately reclaimed once the gas pipes are placed in the pipeline trenches.

The producing well sites (approximately 80 percent of the total wells drilled) will be reduced to a maximum one-half acre area after the well is put in production. Table 3.125 displays the estimated area disturbed from production, under a low, medium, and high scenario.

Table 3.125 Area Disturbed from Production

Number of Wells	Area Disturbed from Production (Acres)			
	Well Pads	Flowlines	Roads	Total
Low 3	1.5	4.5	6	12
Medium 41	20.5	61.5	82	164
High 97	48.5	145.5	194	388

The total acreage from drilling and production disturbed after all wells are drilled will be approximately 12 acres for 3 producing wells. Producing wells will average approximately 1.2 acres per year surface disturbance until such time that the well ceases to produce and is then fully reclaimed. It should be noted that the total amount of disturbances will not occur at the same time, and wells will be abandoned and restored during the years of field development.

Coal Bed Methane

The coal bed methane scenario is unique for the Ouachita National Forest and is a relatively recent situation, commencing in 2004. Prior to 2003, there was no interest expressed in coal bed methane on the Forest. If the coal bed methane well that was drilled and is producing on the Poteau Ranger District in 2004 is the start of a trend, it is expected that as many as 6 to 8 more coal bed methane wells will be drilled by 2008. Then by 2018 at the latest, all wells will have ceased producing (commencing in 2009) and would have been fully reclaimed, along with associated access roads and flow or pipelines. Well pads will be 2 acres initially, reduced to one-fourth of an acre for surface production equipment. Average road access will be 1.5 acres, and pipelines/flowlines will be one acre (pipelines that result in cross-country routing will typically be minimum to near minimum widths of 3 to 10 feet). Pipelines placed in road rights-of-way do not increase surface impacts already considered for the road. In the case of coal bed methane scenario, 100 percent of the wells drilled will be producers. Table 3.126 displays the area disturbed from production of coal bed methane, both the drilling operation and the overall production operation.

Table 3.126 Area Disturbed from Production of Coal Bed Methane

	Area Disturbed from Production of Coal Bed Methane				
	Wells (#)	Pad Site (acres)	Access Road (acres)	Pipeline (acres)	Total (acres)
Drilling	7	14	10.5	0	24.5
Production	7	1.75	10.5	7	19.25

On average, 24.5 acres, or 2.5 acres per year, will be impacted. However, within two months from the commencement of drilling, 1/5 of the surface impacts (average ½ acre) will be fully reclaimed resulting in an average two acres surface impact per year. Within five to 10 years, 100 percent of the surface impacts will be fully reclaimed. If pipelines associated with production are discounted because reclamation is immediate once the pipe is placed in the line, then total surface impacts are 12.25 acres, or 1.2 acres per year. The current well drilled and producing on the Forest in 2004 has a ¼-mile access road and ¼-acre area on the pad site for production equipment (total ½ acre). The gas pipeline is in the road right-of-way. An additional ½-mile pipeline was placed along a county road, for an approximate ½-acre impact. The ¼-acre pad section and ¼-mile road access road will continue to be used for the next 5 to 10 years until production is completed. The additional gas pipeline section was immediately reclaimed once the pipe was placed in the line.

To minimize effects, access and pipeline routes will follow existing roads wherever possible, although new road and pipeline construction may become necessary in some cases. The locations of all well pads, access roads, and pipeline routes are evaluated based on appropriate NEPA procedures and the effects of actions on sites located by engineers, geologists, or special use scientists are disclosed. Gas pipelines are essential and unique to the transport needs of the energy minerals that are produced. Pipelines mainly occupy road rights-of-ways in linear covered

and reclaimed trenches. Vegetative clearing widths vary from 10 to 30 feet. Pipelines following cross-country routes will be constructed to minimum 3 to 10 foot clearing widths. As soon as a pipe is placed in the pipeline trench, the trench is immediately fully reclaimed. The amount of time the surface is disturbed from trenching is very temporary, ranging from hours to several days. To adequately disclose what environmental impacts are associated with this projected activity, the drilling process needs to be itemized and analyzed.

Typical Drilling Scenario

Historically, wells in Arkansas are drilled on a 640-acre spacing. The number of wells drilled is dependent on the oil and gas market values and the perceived impact of the lease stipulations by the oil and gas industry.

In this geographic area, the standard approach is to drill vertical holes from a single drill pad down to the target formation. The deeper the suspected oil/gas bearing rock layer lies, the larger the drill rig must be and, consequently, the larger the drill pad must be to accommodate it. Since the known producing zones north of the Forest boundary, primarily in the Arkansas River Valley, lie relatively shallow with deeper plays to 6,000 feet, smaller drill rigs and pads are needed.

Preparation for the drilling process includes construction of an access road, a drilling pad, and a reserve pit. Typically, one to two acres are cleared and graded level for construction of the well pad; however, depending on the topography of the well site and access area, this construction may require the creation of cut slopes and fill areas that may disturb additional area. The excavated reserve pit is usually about five feet deep and is lined with bentonite clay. Plastic or butyl liners (or its equivalent) that meet state standards for thickness and quality are used on occasions when soils are determined incapable of holding pit fluids. Constructed access roads normally have a running surface (width) of approximately 15 feet and a right of way of 30 feet; the length is dependent upon the well site location in relation to existing roads or highways. The average length of road construction will be about one-half mile or less (approximately one acre of disturbance).

Because the cost of rig time in drilling a well is usually several thousand dollars a day, drilling is conducted 24 hours a day, seven days per week when possible, yielding a short period of time when the site is impacted by the drilling activity. Wells are usually drilled in seven to 30 days depending on the depth of the hole, the number and degree of mechanical problems, if a well is a dry hole or a producer, etc. Wells would be drilled by rotary drilling rig using mud as the circulating medium. Mud pumps would be used to force mud down the drill pipe, thereby forcing the rock cuttings out of the wellbore. Water used in the drilling process would normally be from a well drilled on the site; however, water could be pumped to the site from a local pond, stream, or lake through pipe laid on the surface. Water could also be hauled to the site by the use of water tanker trucks. Shallower wells could be drilled with air instead of mud. Pad size and access would be the same.

Approximately 500 barrels of drilling mud will be kept on the location. Mud will also be needed for some down hole logging programs. Water production will be expected during the life of the field, separation, dehydration, and other production processing may be necessary. Construction of facilities off federal lands may be needed to handle this processing. Some processing or temporary storage may be necessary on site, usually in the form of tanks.

Material used in construction of the pads and access road (i.e., rock, shale, or gravel fill) is obtained from pre-approved sources. Shale and/or gravel used in construction of the drilling pad are stockpiled when restoring the area. For all surface-disturbing activities, the topsoil to be removed is stockpiled for redistribution over the disturbed area prior to fertilizing and reseeding of the site. Surface soil material stockpiles should be located to avoid mixing with other subsurface materials during construction and reclamation. Stockpile locations should be located so wind and water

erosion are minimized and reclamation potential is maximized. In areas where excavation will be extensive or extreme, or where bedrock will be encountered, existing topsoil is replaced.

Restoration of the area includes reseeding of the area with natural grasses as determined by the authorized Forest officer. If drilling results in a producing well, the drilling pad must be reduced to a maximum area of 10,000 square feet (0.23 acres) and the remainder is restored to blend into the natural terrain. For a producing well, the operator will either install tanks on site to hold the oil and any produced water or a pipeline will be hooked up to the well head and the product transported off site. A producing gas well will have a pipeline connected to the wellhead, and the gas will then be pumped off through these gathering lines. Either way, the amount of space required for these facilities is considerably less than the original pad size and will be reclaimed around the unneeded edges.

Pipelines and/or flow lines will be constructed in conjunction with the construction of the access roads whenever possible to minimize additional disturbance. Pipeline right-of-way shall not exceed 30 feet in width. Exact right-of-way widths may be set by ground conditions. Whenever possible, when buried, pipelines must be at a depth of at least 48 inches. Any deviation from the 48-inch depth must be approved by the appropriate Forest Service officer prior to any surface disturbing activity taking place. When possible, a common point of collection shall be established to minimize the number of production sites. All pipeline designs, construction, operation, and maintenance shall comply with Federal Safety Standard for Gas Lines, Code of Federal Regulations, Part 192, Title 49, unless more stringent requirements are required by the state.

If the well is a dry hole, or cannot produce commercial quantities of oil/gas, then it will be closed off by plugging and capping the top of the pipe in the hole. All equipment will be removed from the site and the drill pad area will be re-sloped and seeded with a mixture of native plants.

The BLM estimates that, if serious drilling occurs because of a major gas find (aside from coal bed methane) only 19 percent to 61 percent in the Low and Medium categories (and 74 percent in the high category) of the total wells drilled on the Forest will produce commercial amounts of gas. That is, in the "Low" category, of 16 total projected scenario wells to be drilled over the next 10 years, only 3 of the wells would likely be producers. In the "Medium" scenario category of 66 wells drilled, 41 may possibly result in production. The rest will be reclaimed within a month of building the drill pad.

With an average of 5 acres of disturbance for each well (2 acre for the access road and 3 acres for the drill pad), about 8 acres total each year may possibly be disturbed on the Ouachita National Forest for oil and gas development. About 90 percent of the well pad surface disturbance will be reclaimed within a month in the case of a producing well, with the remaining 10 percent being reclaimed at the end of the production phase of the well. For non-producing wells, 100 percent will be reclaimed within a month.

Specific impacts to air quality include fugitive dust from vehicle traffic on the access road and during construction of the drill pad. There will be tailpipe emissions from the vehicles transporting the rig and pipe to the site as well as from diesel motors for running the on site engines. In the few cases that natural gas may be encountered, some gas will be flared to the atmosphere in the production tests.

Water quality may be locally degraded by sedimentation resulting from airborne dust settling out on streams and lakes and from erosion of the access road and drill pad. A small fraction of the stockpiled topsoil from the site could be washed into the local drainage by storm runoff in the 7 to 30-day window that drilling is taking place.

Soil impacts include displacement and compaction. There will be an average of three acres per drill site (one acre of new road and two acres for the drill pad) of soil disturbance. The surface of the road and drill pad will be compacted by the use of vehicles and machinery. Impacts to soil resources are reduced by requiring pads to be constructed to protect topsoil until fully reclaimed. Topsoil is then replaced on the reclaimed site. Pads are also insloped and designed to reduce water runoff. When reclaiming the access road and drill pad, it is standard procedure to use a ripper to relieve compaction prior to re-contouring, spreading the topsoil over the disturbed area, and seeding with native species. When gravel has been brought in to surface parking and work areas, that gravel is removed as part of the reclamation process.

Vegetation occupying the areas to be disturbed for road and pad will be uprooted and destroyed. Any commercial timber will be sold ahead of road and pad building. Wildlife will be displaced from the immediate area of surface disturbance, and the noise, lights, and activity of workers and machines could disturb wildlife in the surrounding environs. However, some species will benefit from the creation of vegetative edge effects and early serial habitat creation. Aquatic animals could be impacted by airborne dust settling on the nearby streambeds and pond bottoms. Sediment washed down from the disturbed sites would also adversely impact aquatic life.

Species on the Threatened or Endangered List will not be adversely impacted by drilling activity. Habitat areas containing these plant and wildlife species are inventoried and special stipulation(s) will be included in the leases that are issued. Even if a new Threatened or Endangered species or the new location of an existing one is found subsequent to a lease being issued, the standard terms of an oil/gas lease require that a survey for Threatened or Endangered species be completed in any proposed drilling location. If any are found, accommodation for it (up to and including completely moving the drill site) must be done before surface activity can be permitted.

It is possible that oil/gas drilling will cause some adverse impact on recreational activities such as bird watching or hunting. These will be short in duration, however, and very localized in effect. There could also be an increase in habitat created for some game animals thus making the local population larger and the hunting experience more successful.

Based on the topography of the Forest, most visual impacts will be fairly subtle and easily screened from most viewsheds. There will be some added visual contrast by small open spaces in areas that were at one time completely forested.

As with Threatened or Endangered species, cultural resource surveys must be done of all proposed access roads and drill pad locations to insure no heritage resources are disturbed or lost. Depending on the sensitivity of the cultural resource and its susceptibility to disturbance, the road/drill site location can be moved. In a few cases, the oil/gas operator may choose to pay for complete excavation and curation of the cultural site in order to keep the proposed drill location in its original place.

There will be a positive economic effect on the local economy in areas close to drill sites. The drilling operation will rely on local merchants for food, fuel, and supplies (see Cumulative Effects), and often housing as well. Pad and road construction is often subcontracted to local companies or companies employing local expertise.

Salable (Common Variety) Minerals

Common varieties of mineral materials (CVMM) include aggregate, landscaping rock, riprap, flagstone, and other earthen construction materials. The Forest and local, state, and county agencies and the public uses mineral materials from existing pits on the Forest for road aggregate. Some pit removals are for commercial purposes (approximately 12 contracts per year) under Forest

Service issued contracts that are open only for one-year periods. Most contracts are issued to the public for personal purposes such as gravel for resurfacing driveways and stone for yards and fireplace construction. Most of the mineral materials used by the Forest Service are extracted from designated pits on the Ranger Districts. These removals take place at dispersed sites across the Forest. Short duration and small tonnage building stone contracts are issued to members of the public when requested for hand removal of surface exposed building stone.

No new mineral material sites are being proposed in the current planning period. However, if a new pit were to be developed, the environmental effects of establishing it would include scraping off and stockpiling the topsoil for later use in reclamation of the site. There would be some soil loss from wind and rain runoff. A localized decrease in air quality would result from dust released from the mining of the material as well as vehicle traffic to and from the pit. Vehicle emissions would also temporarily lower the local air quality. Wildlife and vegetation would be displaced from the pit site itself. Noise associated with operating equipment, vehicle, and people in and around the pit and access road could disturb some nearby fauna. Depending on the site-specific location, visual quality may be impaired. However, vegetative screening can usually mitigate this to a large degree. Prior to any surface disturbance of the site, the mandatory surveys for threatened and endangered species and cultural resources will have been done. If any of these resources are present and mitigating measures would not be adequate to protect them, then the site would not be developed.

Rockhounding

There is virtually no impact on other Forest resources from rockhounding or panning. The rockhounders will employ bare hands, small rock hammers and hand tools, or garden trowels. There are no economic implications from rockhounding and/or panning.

Private Mineral Rights (Reserved and Outstanding Mineral Rights)

Forest Service direction for the administration of reserved and outstanding rights is found in Chapter 2830 of Forest Service Manual 2800.

The exercise of private-mineral rights produces both mineral exploration and mineral development in various areas of the Ouachita National Forest. The purpose of this section is to discuss how the Forest Service manages mineral exploration and development on reserved and outstanding rights (ROR) under federal surface ownership.

The only minerals operation on Private Minerals under the Ouachita National Forest is a single coal bed methane gas well. Impacts to the Forest are discussed previously, and no alternative will affect the production of coal bed methane gas with the exception of Alternative D, which recommends an additional 30,127 acres for wilderness.

An important difference in the administration of ROR is that the development of private minerals is a right of the mineral owner. Reserved mineral rights are subject to state laws and Secretary's Rules and Regulations (SR&R) that were made part of the severance deed when the land was purchased by the United States. In reserved mineral cases under SR&R 1937, 1947, 1950, and 1963, the operator must submit an operating plan. If the operating plan is acceptable, the Forest Supervisor will issue a "Reserved Minerals Permit." If the operating plan is not acceptable, the Forest Service shall meet with the mineral owner or lessee to negotiate modifications needed to make the plan acceptable. For outstanding minerals the mineral owner or lessee provides the Forest Service a proposed operating plan. Outstanding mineral rights are subject to the terms of the Severance Deed and State Law. The Forest Service reviews the plan and negotiates the operating conditions for mitigation of surface disturbance with the operator and has no recourse to disallow the project, except through acquisition of the mineral estate.

The following discusses two interrelated potential effects relating to outstanding and reserved mineral rights on the Ouachita National Forest: 1) the potential effects of the alternatives on the exercise of private mineral rights on National Forest System lands, and 2) the potential effects of private mineral rights operations on National Forest System lands.

The exercise of private mineral rights to explore and develop privately owned minerals on NFS lands is a private decision, not a federal decision. Tens of thousands of acres on the Ouachita National Forest System lands were acquired subject to these private mineral rights. All alternatives are subject to these existing private rights (outstanding and reserved mineral rights), and the U.S. is bound by the terms of the mineral reservation.

The alternatives do not create any measurable potential conflict with private mineral rights.

Direct and Indirect Effects

Of the 1,417,815 acres of combined Federal mineral and surface estate lands available for lease, there are three levels of restrictions on mineral development: 1) lands leased subject to standard lease terms; 2) lands leased subject to a Controlled Surface Use (CSU) stipulation; and 3) lands leased subject to a No Surface Occupancy (NSO) stipulation. Table 3.127, Oil and Gas Leasing Consent Decisions, lists the acres and percentage of lands available subject to each level of restriction, under each alternative. Alternatives C and E each recommend 1,793 acres for wilderness designation, and Alternative D recommends 30,127 acres for wilderness designation. The consent decision would change based on the designation of these areas for wilderness.

Table 3.127 Oil and Gas Leasing Consent Decisions – Acres and % Forest Affected by Each Alternative (% based on 1,780,101 Total Forest Acres)

Stipulation	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
	Acres over Percent				
No Leasing (Wilderness and "Wild" River)	65,714, 4%	65,714, 4%	67,507, 4%	93,841, 5%	67,507, 4%
NSO: No Surface Occupancy Stipulation	66,875, 4%	66,875, 4%	66,875, 4%	66,875, 4%	66,875, 4%
CSU: Controlled Surface Use Stipulation	755,979, 43%	755,979, 43%	755,979, 43%	755,979, 43%	755,979, 43%
Standard Stipulations	891,533, 49%	891,533, 49%	889,740, 49%	863,406, 49%	889,740, 49%

When considering the total acreage of the Forest, the following applies for each alternative evaluated in the FEIS: 82,021 acres (5 percent of the Forest) is 100 percent private mineral rights, and 65,714 acres (4 percent of the Forest) are acres currently designated as Wilderness and/or a Wild portion of a Wild and Scenic River which are withdrawn from any type of mineral development. The minerals potential for the Forest cannot be fully evaluated on those lands that are not available for mineral entry. Consequently, the mineral resource will not be explored or developed on withdrawn status lands.

The direct effect of each alternative on the amount of minerals available for lease with standard lease terms is minimal. This includes the Selected Alternative (Alternative E). While acreages would change in various alternatives, the changes would not be sufficient to significantly affect the

percentages for any lease category in any of the alternatives. The total acreage available for lease would remain virtually the same.

The acreage added to the restricted category would indirectly make mineral operations on the Forests more difficult and potentially more expensive for the lessee but it would allow for increased resource protection on the Forest. In addition, these restrictions could force companies off National Forest System lands onto lands with reserved or outstanding mineral reservations where the Forest would have less control over surface disturbing activities. From a minerals management perspective on the Forest:

- Alternatives A and B provide the best opportunities to explore for and develop the mineral resources on the Ouachita National Forest because they follow the 1990 Forest Plan parameters and do not place an emphasis on new wilderness additions that effectively withdraw affected lands from mineral entry.
- Alternative C emphasizes ecosystem health and recommends 1,793 acres of wilderness additions to three existing wildernesses. This alternative provides good opportunities for minerals exploration and possible development.
- Alternative D emphasizes recreation and scenery management and the addition of 30,127 acres of wilderness including additions to three existing wildernesses and creation of three new wildernesses. The emphasis in this alternative would have the greatest relative impact on minerals exploration and possible development.
- Alternative E combines elements of B, C, and D and blends increased active management in some areas with recreation and scenery emphasis in others. Alternative E recommends the addition of 1,793 acres to three existing wildernesses. This alternative will provide good opportunities for minerals exploration and possible development.

Cumulative Effects

The following discussion applies to the cumulative effects of the consent to allow exploration decision. It does not address the cumulative effects of each alternative on the minerals program or resource because there are no changes by alternative to the minerals program with the exception of Alternative D, which would recommend 30,127 additional acres of wilderness. Wilderness acres are not open for mineral exploration. Therefore, Alternative D would have the effect of reducing the potential for mineral exploration by 30,127 acres; however, the locations of the recommended wilderness are not known to be mineral deposit areas.

The cumulative effects anticipated to result from mineral activity on the Forest over the next ten years will be associated with coal bed methane exploration and possible development, possible natural gas exploration, existing hardrock minerals operations (quartz, novaculite, gravel, and building stone), and with new proposed hardrock minerals operations.

It is projected that there will be 7 to 16 gas wells drilled on the Forest, with 7 being commercially productive. The rest would be dry holes and the sites reclaimed. For each of the producing well sites, the area needed for production would be less than was needed for the drilling phase. The size of the drill pad would decrease from two acres of disturbance down to about ¼-acre, with the unneeded portion reclaimed. Thus, there would be a residual of 1¼ acres per new producing well (one acre for the access road and ¼-acre containing the pump jack and ancillary tanks or pipelines) not reclaimed until production ceased. Cumulative effects from pipelines are limited when construction occurs in established rights-of-ways. The time it takes to dig the linear pipeline trench, place the pipeline, backfill the trench and pipeline, and reclaim the trench is only a matter of hours for a given linear section. Special trenching machinery allows for a light touch on the land surface when trenching is required across country. Minimum pipeline width is approximately 36 inches. Pipelines are immediately reclaimed. After gas production ceases, pipelines are flushed and may

be left in place or removed. The determination to leave a pipeline in place or remove it as part of the reclamation is made in the Environmental Analysis. There would be approximately 15 acres of new, unreclaimed area over the 10-year plan period. The average surface disturbance over the term of the Forest Plan would approximately be 1 ½ acres per year.

In the next 10-year planning period, 5 new quartz operations are expected to occur, involving an approximate total of 15 new impacted acres for an average of 1 ½ acres per year. Most case sites are operated intermittently. The nature of hardrock mining operations on the Forest requires that they proceed at a slow and methodical pace. These are all surface operations. Potential impacts to offsite resources are primarily from runoff. This is negated or minimized by requiring mining design to keep runoff waters onsite. New common variety mineral material operations are expected to occur at the rate of at least 40 to 60 per year. These are small tonnage, short duration removals primarily from within the existing 22 pits and the primary building stone site on the Forest. Operations outside of existing pits are small tonnage (generally several pickup loads), hand removals of surface exposed building stone. Site-specific environmental analysis is conducted on all new sites. Gravel pits on the Forest are long-term impacts to allow controlled centralized access to essential pit-run aggregate resources. Pits are designed to prevent water runoff and consequent siltation from leaving the pit site and impacting adjacent Forest resources. All pits on the Ouachita National Forest are worked intermittently by counties and Forest Service contractors removing material for public projects (roads, etc) as needed. Cumulative effects outside of existing pits are limited to minor vegetative disturbance (no surface disturbing excavations). Some existing pits may undergo limited expansion. An average of 1-acre expansion per year total for all existing pits would result in an overall average of 0.05 acres per pit per year.

There are positive economic impacts resulting from oil and gas exploration and development activities. Lessees/operators usually contract locally for road and drill pad construction. They purchase food, fuel, lodging, and other supplies from local sources and may subcontract certain parts of the operation to local well servicing companies. Most of the salaries paid to workers are spent in the local area. The estimated dollars that an average drill rig generates per day is over \$200 per worker. A typical well drilling operation will have an average of 10 to 20 workers. This translates into about \$2,000 to \$4,000/day spent in the local area. Since the average gas well in this area takes two to four weeks to complete, \$28,000 to \$112,000 per well goes into the economy. There are 59 hardrock mining cases for quartz crystal, novaculite, wavellite, aggregate (gravel), and building stone, and one energy case for coal bed methane. The accumulated total existing surface impacts from these operations located across the Forest is approximately 120 acres. Average surface impact is less than two acres per case. This represents less than one-tenth of one percent of the total Forest land base.

Livestock Grazing

About 114,537 acres in Oklahoma and 161,278 acres in Arkansas are considered suitable for livestock grazing. Since 1979, the number of grazing allotments has declined from 111 to 18 in 2004. There are 10 allotments in Arkansas and eight in Oklahoma (as of September 2005). Six of the eight allotments in Oklahoma were established as part of the land acquisition of the Broken Bow unit in 2003. Currently, three of the Arkansas allotments are vacant. During the 2004 grazing season, permits were held by 32 permittees for a total of 903 head of cattle or 5,081 animal unit months (AUMs).

Beginning with the 2004 grazing season, livestock stocking rates were based on primary range which includes transitory regeneration areas (stands with trees ranging from three to 10 years old) and permanent pastures. About 68 acres of suitable range in Arkansas (Womble Ranger District) are maintained as permanent pasture land. These pastures are non-transitory with livestock forage production being the primary management objective.

No forest grazing associations are organized, but approximately 101,195 acres of intermingled Weyerhaeuser Company lands on the Jessieville Ranger District are under cooperative grazing agreement with the Forest Service. This agreement, signed in December 1967, gives the Forest Service the authority to administer these intermingled lands for all grazing purposes. Weyerhaeuser pays a fee to the Forest Service for grazing administration services and receives a pro-rata share of the grazing receipts generated.

Demand for Forest grazing has been decreasing since 1975. Declining demand is seen as a result of several contributing socioeconomic factors:

- The Forest has a predominance of aging permittees who are starting to phase out their operations or retire altogether. This, coupled with younger generations moving away from single-family livestock operations, has resulted in a loss of permittees without replacement. The elimination of traditional "woods grazing," where livestock were simply placed on the Forest, and the change to a 6-month grazing season rather than year-long grazing further discouraged grazing on the Forest.
- Large livestock operators who depend solely on livestock operations as their primary source of income are not interested in Forest grazing since they have no control with regard to public access on Forest rangelands.
- As annual grazing fees are increased in an effort to recover "fair market value" for public land grazing, many permittees have responded by lowering their permitted herd sizes or by leaving the public land grazing program altogether.

Demand is expected to continue declining. For planning purposes, grazing capacity is constrained at an availability level of 12,036 AUMs. Projected demand is less than "Current Direction" AUM's capacity and "Maximum Potential" AUMs for all periods. Current grazing allotment for the Forest are displayed in Table 3.128.

Table 3.128 Grazing Allotments for Forest

Allotment Name	Type	Unit	Total Area	National Forest System Area	AUM Capacity
Arkansas					
Aly	Active	Jessieville	11,266	2,372	826
Bear Creek	Active	Jessieville	37,243	13,177	1,606
Graham Creek	Active	Jessieville	22,362	7,435	1,364
Irons Fork	Active	Jessieville	30,284	16,752	1,130
Liberty	Vacant	Jessieville	22,435	10,976	195
North Fork	Vacant	Jessieville	40,719	35,044	2,014
Ouachita Pinnacle	Active	Jessieville	40,719	35,044	537
Possum Kingdom	Active	Jessieville	31,300	16,833	844
Mauldin	Vacant	Womble	145	145	123
Alum Fork	Active	Winona	26,000	23,500	114
			AR TOTAL	161,278	8,775

Allotment Name	Type	Unit	Total Area	National Forest System Area	AUM Capacity
Oklahoma					
Buffalo Creek	Active	Tiak	17,500	17,500	538
Holly Creek	Active	Tiak	21,000	21,000	263
Upper Glover	Active	Tiak	5,600	5,600	506
Cedar Creek	Active	Tiak	30,800	30,800	760
Lower Mountain Fork	Active	Tiak	5,500	5,500	381
Otter Creek	Active	Tiak	17,400	17,400	141
Sycamore Creek	Active	Kiamichi	16,812	9,229	490*
Lenox	Active	Kiamichi	8,804	7,508	182*
			OK TOTAL	114,537	3,261
FOREST TOTAL				275,815	12,036

* Numbers represent actual use in AUMs.

Direct and Indirect Effects

Grazing by domestic livestock may alter vegetation structure and composition and thus, habitat for some wildlife species. Habitats for wildlife may be improved, degraded, or unchanged as a result of grazing. Effects depend upon the wildlife species, cattle stocking rates, the amount of forage removed, and the time of year that grazing is allowed. Cattle can reduce available cover for ground nesting birds and in some cases, destroy nests by trampling; however, their forage also helps to maintain the herbaceous grass/forb condition required by species such as Northern bobwhite, whip-poor-will, wild turkey, and white-tailed deer. Some soil compaction and erosion can occur in areas where cattle congregate; however, both of these effects are beneficial to certain plant species, which require sunlight to germinate, and disturbed soil to receive seed for regeneration. Fecal material deposited in or near ponds and streams can contribute to bacterial contamination of the water. Grazing on the Ouachita is limited to a six-month season, mid-April to mid-October. Cattle are removed from the Forest during the winter months that are wetter, making soils more susceptible to damage and eliminating competition between deer and cattle for scarce winter forage.

Cumulative Effects

The projected level of grazing does not vary by alternative. Although soil compaction and erosion may result from grazing, these effects are minor and are tempered by the Forest policy of removing cattle from the allotments during the winter months and limiting forage removal to no more than 50 percent of annual growth. Research has shown there are only minor dietary overlaps and little competition between deer and cattle during the growing season. Grazing may reduce the abundance of native grasses and forbs in management areas where the desired condition is a shortleaf pine-bluestem ecosystem.

Heritage Resources

Cultural resource surveys have been completed on over 20 percent of the total area of the Ouachita National Forest, resulting in documentation of almost 8,000 prehistoric and historic archeological sites. The following discussion provides a brief overview of the results of these investigations. Additional information concerning the cultural history of the area can be found in reports such as *From Clovis to Comanchero* (Hofman and others 1989), *Prehistory of Oklahoma* (Bell 1987), and

Heritage Properties

Heritage properties within the Ouachita National Forest consist of three main classes: Prehistoric Archeological Sites, Historic Archeological Sites, and Historic Buildings/Structures.

Prehistoric Archeological Sites are quite varied in nature and consist of isolated occurrences of stone tools or lithic debris to extensive quarries and workshops covering a few hundred acres. Many of the known prehistoric archeological sites are diffuse scattered occupations where lithic debris represents the majority of the cultural materials present. These are largely upland sites and probably represent seasonal and/or special activity occupations from all stages of cultural development. Intensive use of the stream valleys is documented, but did not occur at the exclusion of the upland areas. The larger stream valleys contain larger, more permanent villages, as opposed to the more temporary nature of the upland sites. The majority of the larger stream valleys, however, still remain in private ownership.

The southern edge of the Ouachita Mountains contains extensive outcrops of novaculite, a type of chert, which was used extensively in the manufacture of chipped stone tools by people occupying the Ouachita Mountains and surrounding regions during prehistory. Quarry and workshop sites are numerous in the areas where the novaculite is exposed, and these sites may stretch for miles along the mountain crests. In the northwestern and western portion of the Ouachita Mountains, additional varieties of chert occur, mostly in the Johns Valley formation. Each exposure was utilized extensively for knapping material suitable for stone tools. A third material, silicified sandstone (probably Jackfork Sandstone), was also widely utilized in the northwestern mountains.

The archeological sites within the Ouachita National Forest represent the full range of prehistoric cultural development (i.e., PaleoIndian, Archaic, and Late Prehistoric). Although scarce, PaleoIndian sites do occur, but only as isolated occurrences of lanceolate projectile points. Sites with Late PaleoIndian/Early Archaic Dalton components, however, are relatively common throughout the Ouachita Mountains. Sites dating to the Archaic period occur abundantly. These sites are represented as single isolated artifacts to extensive sites covering more than 200 acres. It is believed that many of the novaculite quarries were utilized during this time period. Overall, little is known about the subsistence of the populations during the Archaic period. Archeologists have conducted limited investigations at several sites within the Little Missouri and Ouachita watersheds during recreation construction projects. Large burned rock features were documented at two of the sites suggesting intensive food preparation activities.

During the first two weeks of December 2004, evaluation excavations occurred with Passport In Time (PIT) volunteers in a large Archaic Period site in LeFlore County, Oklahoma, within the Kiamichi River watershed. Ground Penetrating Radar was used as an aid in selecting areas within the site to be examined by the PIT volunteers. The testing confirmed that the site was occupied during the mid-late Archaic period; some of the dartpoint styles date as early as 6000-8000 B.P. Specific areas within the site were revisited many times during the mid-late Archaic period resulting in several burned rock cooking features. These features occur both as intact burned stone clusters, suggesting intact hearths, and jumbled piles, suggesting discard piles. An abundance of lithic debris, representing most stages of tool manufacture, suggests that tool manufacture and refurbishing was also a major activity.

Although testing and/or excavation have occurred at a limited number of these sites, understanding of how the prehistoric cultural groups used the resources within the mountains remains limited. Many of the early archeological surveys within the mountains suggested that the prehistoric site

density was rather low. In recent years, however, a fairly high density of prehistoric sites has been found (in portions of the Forest, it is as high as one archeological site per 10 acres). Many of these may be low density lithic scatters with low potential for providing important information regarding the prehistoric use of the Forest area; however, many of the sites are recognized as potentially containing intact deposits and features which will be important in understanding of the prehistoric life ways.

More is known of the historic use of the mountains because archeological surveys have documented the presence of numerous farmsteads, extensive logging operations, and intensive mining. Prior to the establishment of the Ouachita National Forest, the majority of the lands within the Ouachita Mountains were privately owned. Evidence of the transportation systems remain in many areas of the Forest. Road segments, mapped on the General Land Office maps in the 1840s, can still be located. The earliest historic occupation occurred as settlers/farmers began moving into the larger river valleys. They first settled the fertile bottomlands, and then began slowly moving into the adjacent uplands as populations increased. Many of the small farms located in the uplands failed due to the poor, rocky soils. The archeological evidence of these small farms consists of house foundation piers, cellar and well depressions, chimney foundations (many of the chimneys were constructed of mud rather than stone), and flowering vegetation. These farmsteads were accompanied by extensive fields; today they are characterized by the presence of vegetation changes, rock walls, and stone field clearing piles and alignments. The small upland farms were then often acquired by timber companies who were increasing land holdings within the mountains. Following the establishment of the Ouachita National Forest, the Forest Service began acquiring tracts from small landowners as well as large cut-over tracts from the timber companies.

Extensive logging occurred within the mountains from the late 19th century into the early 20th century. Archeological evidence for these activities is abundant. Logging sites occur as locations of small portable sawmills and logging trams. Two major, early 20th century sawmill towns in Arkansas, Mauldin and Forrester, were located within the Ouachita Mountains and are on lands now managed by the Forest.

Mining has been an important activity within the Ouachita Mountains. Although no extensive mines occur, intensive exploration has occurred. One of the more well-known minerals that was historically mined and continues to be mined is quartz crystal. Limited evidence of quartz mining in prehistoric times has been documented within the southern portion of the mountains. Historic mining of crystal has occurred for well over a century. Extensive quartz mining occurred in the Mt. Ida, Arkansas vicinity during World War II, and one of these mines has been documented as an historic/archeological site. Numerous small quartz exploration pits across the southern portion of the mountains have been documented as archeological sites.

Manganese was also intensively mined in a few areas within the Caddo, Mena, and Womble Ranger Districts. Numerous shafts and adits are documented within these three districts. The North Mountain mine, on the Caddo District, was one of the larger operations. These mines were often directly associated with local milling operations; remains of several of these manganese mills have been documented as historic sites. The most extensively documented is near the Shady Lake Recreation Area on the Mena Ranger District. Slate mines and one slate mining town are located on the Caddo District.

Numerous other types of historic archeological sites occur and have been documented within the Forest. These include grist mills, schools, churches, developed springs, cemeteries, whiskey stills, and Works Progress Administration (WPA) and Civilian Conservation Corps (CCC) constructed sites. Included in the inventory of historic buildings on the Forest are 95 structures that have been listed on the National Register of Historic Places.

The CCC enrollees contributed undocumented numbers of man-hours to the creation of recreation areas, transportation systems, fire protection, and reforestation for the Ouachita National Forest. Most of the Forest's major recreation facilities and many of its major access routes were constructed, at least in part, by the CCC. The recreation sites contain structures as simple as picnic shelters to those as elaborate as bathhouse facilities. Many of the recreation areas were landscaped with stone walls, flagstone walks, and hiking trails. Stone, earthen, and concrete dams that created small reservoirs were constructed at several of the recreation areas such as at Shady Lake and Lake Sylvia in Arkansas and Cedar Lake in Oklahoma.

In addition to the recreation facilities, the CCC constructed administrative buildings such as work centers, residences, district offices, and fire towers. The CCC constructed a dam, and the WPA constructed several buildings for the Ouachita Girl Scout Council in Perry County, Arkansas. This facility, known as Camp Ouachita, served the Girl Scouts of central Arkansas for almost half a century. It was only in 1980 that the Scouts vacated this facility due to insufficient potable water. Currently, the caretaker's cottage and the Great Hall have been restored, and plans are being developed for the other buildings. Almost a dozen former CCC camps are currently documented as historic sites across the National Forest. No structures remain on any of these sites, only foundations.

The CCC and WPA constructed facilities have played a very important role in serving the recreation needs of the citizens of Arkansas, Oklahoma, and surrounding states. Many of these structures still serve important roles. Most of the CCC and WPA buildings, many of the structures (such as bridges and dams), and some of the landscaping features are currently listed on the National Register of Historic Places. Other structures, such as some of the CCC constructed stone culvert headwalls, are eligible for listing on the National Register. In addition to the structures specifically constructed for Forest needs, the Forest Service has acquired other historic buildings that may have local and regional historical significance, including two farmhouses located on the Oden and Poteau Districts.

The heritage program on the Ouachita National Forest is currently overseen by a Heritage Program Manager, five Zone Archeologists, and eight Heritage Resource Technicians. In compliance with the National Historic Preservation Act, the Forest routinely consults with the Oklahoma and Arkansas State Historic Preservation Officers, the Oklahoma State Archeologist, the Tribal Historic Preservation Officers at the Caddo Nation of Oklahoma, and the Choctaw Nation of Oklahoma, as well as the Cultural Resource staff of the Chickasaw Nation, and the Native American Graves Protection and Repatriation Act Representative of the Quapaw Tribe.

Direct and Indirect Effects

All planned projects receive review and, if necessary, inventories are conducted prior to any land disturbing activities. As required by National Historic Preservation Act, sites that have not been evaluated for significance must be protected and managed as if they were listed on the National Register. Inventory surveys are continuing on a project-by-project basis.

If direct effects (physical disturbance) to significant cultural resources cannot be avoided during project implementation, mitigation may include data recovery through consultation. Other direct and indirect effects may occur as a result of recreation use and could include soil erosion and compaction of historic properties.

Alternative C, the alternative with the highest projected rate of ground-disturbing activities (acres of timber harvesting per year), would have a slightly higher probability of negatively affecting heritage resources than the other alternatives, because acres of timber harvesting increase, there is a greater chance that some potentially significant heritage resources will not be detected during regular (pre-treatment) heritage resource surveys. Making the same assumption of correlation

between activity level and impacts to heritage resources and using the acres of vegetation management as a measure, Alternative A has the second highest potential for impacts to heritage resources followed by Alternatives D, E, and then B. Forest-wide standard HR 004 ("If previously undocumented cultural resources are encountered during ground disturbing activities, halt activities until site significance is determined, regardless of whether the area has been previously disturbed") provides a safeguard.

Prescribed fire may be used to cost effectively control damaging vegetation growth on historic ruins and cemeteries, if hand lines or foam/foil are used to reduce heat effects. In order to mitigate disturbances to historic resources, fire lines are installed in existing disturbed areas, or by using natural firebreaks, if feasible.

Similarly, road construction and increased road and OHV trail use could result in the degradation of sites and a reduction in the number of intact historic properties due to increased public access, erosion, and vandalism. The Forest mitigates these potential impacts by not issuing special use easements or permits for roads in or near known archeologically significant areas unless there is no practical alternative location.

Indirectly, natural processes are unavoidably degenerating archaeological deposits through time. Forms of green mitigation may handle erosion, where revegetation with native grasses minimizes tree growth (USDI Technical Brief 8 1992). Tree removal may be used to reduce root penetration and mass wasting from tree throws. All land management activities are reviewed prior to implementation for potential disturbance to significant resources.

Cumulative Effects

Many management activities would not alter heritage resources beyond the natural or cultural impacts they have already received. However, cumulatively, the repeated implementation of all project activities could result in the degradation of historic or prehistoric properties, unless these cumulative actions are considered in management treatments. This is the primary reason that the avoidance option is commonly used. However, in some cases (where vegetation is uncontrolled and results in overstocked, undesirable, or decadent growth conditions that could damage significant heritage resources) avoidance may result in benign neglect. Cumulatively, historic properties could be degraded, destroyed, or subjected to increased site vandalism with continuation of special use permits, increases in and the expansion of mineral extraction sites, the creation of new roads, and expansion and renewal of wildlife plots and pond construction.

Scenery Resources

Scenery Management System (SMS)

Approximately 88 percent (or approximately 1,566,802 acres) of the Ouachita National Forest is classified as moderate to high in importance for visual quality. Much of the Forest can be seen from adjacent or interior roads, trails, recreation areas, vistas, waterways, adjacent towns, and communities due in large part to the wide, open valleys and rounded mountainous terrain that characterize the area. The more scenic landscapes (those in High or Moderate Scenic Class) are generally associated with or occur adjacent to lakes, rivers, and streams, in or near highly developed recreation areas and along trail corridors. The scenic class distribution for the Forest is shown in Table 3.129 with 1 being the highest and 8 being the lowest (the Forest had no acres in scenic classes 6 and 7).

Table 3.129 Acres (April 2003) By Scenic Class for the Ouachita National Forest

Scenic Class*	Acres
1	577,806
2	979,652
3	118,143
4	16,497
5	329
8	87,674
TOTAL	1,780,101

*The Forest had no acres in scenic classes 6 and 7.

Elevations in the Ouachita National Forest range from 2,681 feet at the base of Rich Mountain Lookout Tower to lower elevations of approximately 300 feet along the Fourche La Fave River at the eastern edge of the forest. Views beyond the immediate foreground are influenced by terrain as well as vegetation type and density. The steep to rolling ridges and valleys characterizing the forest are covered with an almost-continuous canopy of deciduous and/or pine forest, creating a natural-appearing landscape character. Portions of the forest canopy have been opened as a result of periodic southern pine beetle infestation and habitat improvement projects, and since the mid-1990s, an increase in oak decline. Openings vary in size from less than an acre to more than 25 acres. Another alteration to forest canopy is attributable to less frequent timber harvest, which has the effect of restricting long Forest views.

Visual Absorption Capability (VAC) is the relative ability of landscapes to defuse human-caused alterations without loss of landscape character or scenic quality. Components of VAC are the degree of visual screening effect inherent in the natural landscape provided by landforms, vegetative cover, and rocks; variety or pattern—generally, the higher the “pattern effect,” the greater the absorption capability; vegetation height, density, and regenerative capability; soil color and geologic stability. The more homogeneous the canopy tree species composition is (as in some pine stands on the Forest), the lower the visual absorption capacity or the greater the contrast of alterations. Areas with steep slopes also have a lower ability to absorb linear alterations than do flatter landscapes.

The Ouachita National Forest generally has a high to very high VAC as a result of generous rainfall, fertile soils, relatively few rock outcrops or talus slopes, and a long growing season. These conditions are less prominent in the north (drier) and eastern parts of the Forest, where sites are somewhat less resilient than in the middle, southwestern portions. Limited management activities such as light timber management, prescribed fires, most road building, disease and pest control activities, if not screened completely by intervening vegetation, are generally only visually evident for one growing season. Unplanned, significant events, such as wildfire, storm damage, and large scale insect and/or disease outbreaks or larger scale management activities, may be evident over a longer period depending upon their location and severity and/or until native vegetation on the site has recovered to reduce contrasts to an acceptable level and intervening or screening vegetation has developed sufficiently to render the occurrence visually unnoticeable.

Physiographic Landscape

The Ouachita National Forest encompasses the Ouachita Mountains in the west central portion of Arkansas and the southeastern portion of Oklahoma. The Ouachita Highlands, the name given to this broad uplifted region, are the only extended area of substantial local relief (high hills and mountains) between the Appalachians and the Rockies and are a unique feature of the North American landscape (USDA Forest Service 1999).

The landscape can be divided into sections based on their individual characteristics of climate, physiography, water, soils, air, hydrology, and potential natural communities (McNab and Avers 1994). The Forest is principally within the physiographic region referred to as the Ouachita Mountains Section. The most northern and southern portions of the Forest also include small portions of the Arkansas Valley and Western Mid Coastal Plains Sections, respectively. Each Section can be further subdivided into Subsections for area-wide planning and watershed analysis. Table 3.130 shows the configuration of these major landscape sections and subsections. These data present the characteristics both common and unique to Subsections within the Ouachita National Forest. As a context to the landscape character descriptions, the following narrative describes the historical range of ecological variability found within the Ouachita Highlands.

Table 3.130 Subsections found on the Ouachita National Forest

Map Code	Section Name	Subsection Name	Subsection Number
1	Arkansas Valley	Western Arkansas Valley Mountains	231Gb
2	Ouachita Mountains	Fourche Mountains	M231Aa
3	Ouachita Mountains	Western Ouachita Mountains	M231Ab
4	Ouachita Mountains	Central Ouachita Mountains	M231Ac
5	Ouachita Mountains	Athens Piedmont Plateau	M231Ad
6	Mid Coastal Plains - Western	Southwestern Arkansas	231Eb
7	Mid Coastal Plains - Western	Red River Alluvial Plain	231Em

Landscape Character

Landscape character descriptions were written for the Forest's four largest Subsections: Western Arkansas Valley, Fourche Mountains, Western Ouachita Mountains, and Central Ouachita Mountains (described earlier in this section). A fifth description was prepared for the Red River Alluvial Plain Subsection. Although two other Subsections, Athens Piedmont Plateau (M231Ad) and Southwestern Arkansas (231Eb), contain more acreage within the administrative boundary than Red River Alluvial Plain, NF ownership of these lands is sparse and highly fragmented. Forest ownership of the alluvium of the Red River, in contrast, is more contiguous.

Landscape character descriptions focus on key attributes found consistently throughout the mapped unit to succinctly convey "word-pictures" to the reader. They are based on the attributes of landform, water, cultural elements, and vegetation, although greater emphasis is usually placed on description of vegetation because vegetation is more easily changed than other attributes in a national forest setting (USDA Forest Service 1995).

Table 3.131 Current Inventory¹ under Visual Quality Objectives

Visual Quality Objective	Acreage	Percent of Landbase
Preservation (includes recommended wilderness)	66,185	3.7
Retention	58,128	3.3
Partial Retention	216,363	12.2
Modification	481,755	27.1
Maximum Modification	765,141	53.8
Total	1,584,914	100.0

¹The scenic resources of the Ouachita National Forest are currently managed in accordance with the 1990 Amended Land and Resource Management Plan. The scenic resource management direction in the 1990 Forest Plan is the Visual Quality Objective (VQO), as determined by the Visual Management System (VMS). The scenic resource has been re-inventoried to comply with the Scenery Management System (SMS). See Landscape Aesthetics, A Handbook for Scenery Management, Agricultural Handbook Number 701 for description of the SMS system and cross-walk between the SMS-SIOs and the VMS-VQOs.

National Forest System lands have been inventoried to identify Scenic Classes from 1 (highest level) to 5 (lowest level).

The crosswalk between Visual Quality Objectives (Visual Management System) and Scenic Integrity Objectives (the updated Scenery Management System) is as follows:

SMS Integrity Ratings

VERY HIGH (Unaltered)

HIGH (Appears Unaltered)

MODERATE (Slightly Altered)

LOW (Moderately Altered)

VERY LOW (Heavily Altered)

UNACCEPTABLY LOW (not a management objective)

VMS VQO Rating

Preservation

Retention

Partial Retention

Modification

Maximum Modification

Scenic Integrity Ratings and Images

Scenic Integrity is a measure of the degree to which a landscape is visually perceived to be complete. Deviations from the aesthetic character that is valued by constituents also diminish an area's scenic integrity. Table 3.132 presents a summary of the ratings and the scenic qualities they represent.

Table 3.132 Scenic Integrity Summary

Criteria for Scenic Integrity of Landscape Character Image/Sense of Place	Very High (VH)	High (H)	Medium (M)	Low (L)	Very Low (VL)	Unacceptably Low (UL)
<u>Dominance</u> Landscape Character vs. Deviation	Landscape Character	Landscape Character	Landscape Character	Deviation	Deviation	Deviation
<u>Degree of Deviation</u> From the Landscape Character	None	Not Evident	Evident but not dominant	Dominant	Very Dominant	Extremely Dominant
<u>Intactness</u> of Landscape Character	Landscape Character Fully Expressed	Landscape Character Largely Expressed	Slightly Altered and Character Expression Moderate	Altered and Low Expression of Character	Heavily Altered and Very Low Expression of Character	Extremely Altered

The most common and most notable impacts to scenic integrity on the Forest are:

- Breaks or unnaturally-appearing openings in forest canopies from logging, firebreaks, utility lines, and other such features
- Structures above the forest canopy such as utilities and cell phone towers
- Canopy species composition, such as species with uniform characteristics (height, texture, such as in even-age pine stands). There may be instances (such as in the Western Coastal Plain subsections) where mostly uniform pine stands are typical of this ecosystem's landscape character
- Dramatic changes in forest canopy types (mixed hardwood against a geometric pine plantation)
- Evidence of recent logging activity such as slash piles and visible stumps
- Roads and road cuts on steep slopes

For the purposes of the Forest Plan revision, Scenic Integrity Objectives (SIOs) were established forest-wide and applied to the landscape using Geographic Information System (GIS) technology. This approach allowed Forest planners a broad overview of Forest visual resource values while also providing detailed information on visual quality at a smaller, project scale. The SIO values for the Ouachita National Forest were aggregated into four general categories: Very High (for wilderness, recommended wilderness, and current and eligible wild and scenic rivers), High, Medium, and Low as shown in Table 3.133. The Very Low scenic integrity objective was not used in this analysis. The SIOs define the different levels of acceptable alteration that may affect the visual resource on the Forest.

Table 3.133 Scenic Class Conversion to Scenic Integrity Objectives for the Forest

Scenic Class*	Acres	Scenic Integrity Objective (SIO)	Total SIO Acres
1 (wilderness and wild and scenic rivers)	97,714	Very High	97,714
1	502,235	High	502,235
2	969,975	Moderate	969,975
3	112,845	Low	210,177
4	16,432	Low	
5	328	Low	
8	80,572	Low	
Total Acres			1,780,101

*The Forest had no acres in scenic classes 6 and 7.

Direct and Indirect Effects

Scenic quality on the Ouachita National Forest has not emerged as an issue during public involvement or direct comment. As a result, scenery management has not been identified as a significant issue for this analysis. Regardless of the lack of direct comments about scenery management, the public's choice of recreational activities and frequent reports of viewing scenery as a prominent recreational activity suggests a desire for quality scenery and scenic experiences. Such preferences became evident during the six public meetings held concerning OHV use on the Forest.

The scenic resource is affected by management activities that alter the appearance of what is visible in the landscape. Short-term scenic effects are usually considered in terms of degree of

visual contrast with existing or adjacent conditions that result from management activity. The scenic landscape can be changed over the long-term or cumulatively by the alteration of the visual character. Management activities that result in visual alterations inconsistent with the assigned SIO, even with mitigation, affect scenery. Management activities that have the greatest potential of affecting scenery are road construction, large-scale and long-term vegetation management, insect and disease control, utility rights-of-ways, and mineral extraction. Other management activities that also can impact the scenic resource at a lesser degree are Threatened and Endangered species habitat management, prescribed fire, fire suppression, land exchange, old growth forest management, recreation, administrative site facility construction, and wildlife management.

Alternatives that receive the highest percentage of management emphasis would result in more protection and enhancement to the scenic resources than alternatives having lower emphasis values. Alternatives D and E have the highest percentage of acceptability, and Alternative C has the lowest. Alternatives A and B continue to use the VMS system.

Negative impacts to scenery from road construction, vegetation management, insect and disease control, special use utility rights-of-ways, and mineral extraction would be the greatest in Alternative C. Impacts would be the lowest in Alternative D because of the high recreation and corresponding scenic component of recreation contained in that alternative. Many of these impacts would be avoided by implementing mitigation measures.

All alternatives propose prescribed fire as a management tool for maintenance or restoration of community types. Drifting smoke, blackened vegetation, and charred tree trunks would be the main negative visual effects. Visual contrast from fireline construction would also be evident. The contrast levels and duration vary with fire intensity. Blackened vegetation usually lasts a short time, but charring of trees may be evident for many years. Repeated prescribed fire often results in a reduced midstory and understory species layer that increases viewing distance, and tends to promote an herbaceous layer (flowering species). Insects and diseases result in weakened, dead, or dying trees and contribute to unattractive contrasts in the landscape. Management efforts to control insect infestations and diseases can minimize or reduce visual effects. However, control efforts that include removal of infected trees and buffer areas often appear as undesirable clearcutting to forest visitors.

Alternatives A and B are minimal change alternatives and continue to utilize the Forest Visual Management System to manage visual resources. Alternative C seeks to maximize forest health and would have an appreciably lower overall visual quality as a result of intensified forest health activities. Alternatives D and E are both designed to increase recreation opportunity and visual quality; however, Alternative E shares that emphasis with forest health and would, therefore, have reduced emphasis on recreation and visual quality when conflicts occurred with forest health issues.

Utility rights-of-way (ROW) have a high potential for affecting the scenic resource for long periods. Cleared ROWs, utility structures, and associated facilities often have high visual contrast and may be incongruent with existing landscapes. Cleared ROWs generally contrast in form, line, color, and texture when compared to the natural appearing landscape. None of the alternatives maximize or allow marked increases in utility line ROWs.

Mineral management and development activities can involve major landform alteration, as well as form, line, color, and texture contrasts, causing substantially adverse scenic impacts. On the Ouachita National Forest, significant activity in natural gas location and recovery is currently underway. In addition, the Forest is well-known across the country for its quartz crystal deposits, which are mined commercially as well as by Forest visitors. Disturbances for gas location and recovery primarily involve road building and short-term impacts to vegetation. Crystal mining is held

to minimum sizes; however, most crystal mines are open-pit mines that require careful site location, on-going maintenance, and restoration to protect visual quality. Gravel mining seldom takes place on the Forest and has a low visual impact due to associated low activity levels.

Road maintenance, especially ROW maintenance, affects scenery. Mowing frequency and timing alters the appearance of the landscape. Road construction introduces unnatural visual elements into the landscape and causes form, line, color, and texture contrasts. Road management controls how much of the landscape is seen by having roads open or closed. None of the alternatives propose increased road building over existing levels.

Vegetation management has a great potential to alter the landscape and impact the scenic resource. Timber harvest practices can cause long-term effects on scenery by altering landscape character through reduction in species diversity, manipulation of the prominent age class, and alteration of opening size, location, and frequency. The potential effects may be positive or negative, depending on their consistency with the desired condition of the landscape.

Of the management applications, even-aged management may be the most visually impacting. Among the even-aged regeneration methods, clearcutting and seed-tree harvest produce the highest visual contrasts because this practice requires the removal of most of the forest canopy and the creation of openings. These openings would vary in their effects on scenery depending on size, shape, location, and nearness to other openings. Openings that repeat the size and general character of surrounding natural openings and the landscape character would impact scenery the least. Alternative C would allow the greatest manipulation of vegetation of all alternatives. However, treatment of insect and disease outbreaks often requires vegetation manipulation methods that may appear to be clearcuts or seedtree harvests with longer lasting impacts. Under the circumstances of an insect and disease outbreak and for the health of the overall forest, these impacts may be necessary and warranted. Single-tree selection and group selection harvest are normally less evident because they do not cause large openings in the canopy. Uneven-aged regeneration methods can affect scenery, causing contrasts in form, line, color, and texture from slash production. All vegetative impacts as a result of timber harvest are short-term because of rapid vegetation growth.

Site preparation activities affect scenery by exposing soil and killing other vegetation. These effects are generally short-term. Mechanical site preparation and prescribed fire usually improves the appearance of the harvest area by removing the unmerchantable trees and most of the broken stems. Stand improvement work can affect scenery by browning the vegetation, reducing visual variety through elimination of target species. Alternative C would support more site preparation than the other alternatives with Alternative E following second.

Prescribed fire forest-wide and midstory reduction in pine-bluestem communities are common wildlife management practices. Midstory reduction and prescribed fire reduce midstory diversity and, over time, produce stands with open understories allowing views into the landscape. Creation of wildlife food plots and enhancement of existing food plots and wildlife areas (such as walk-in turkey areas) may also impact scenic quality through the creation of forest canopy openings.

Recreation facilities are deviations from the natural landscape. Forest Service recreation facilities are designed to blend into the landscape without major visual disruption. None of the alternatives increase recreation site numbers or support major expansions of recreation areas. However, vegetation management for visitor safety and forest health may take place in recreation areas and may impact the primarily recreational nature of the site for short periods.

Cumulative Effects

Due to a demand for “wilderness experiences” expressed by the public, designation of wilderness will be regarded as a positive effect on scenery. Old-growth forest character will be created over time. Alternatives C and E propose to add 1,793 acres of wilderness in three parcels to existing wilderness areas. These additions are not expected to impact scenic resources. Alternative D proposes to add 30,127 acres of additional wilderness. This addition would enhance visual quality in the area of the new wilderness; however, this addition represents less than 1.7 percent of the entire Forest. No appreciable cumulative impacts to scenic resources outside the general area of the new wilderness are expected.

Wilderness and Roadless Areas

Wilderness

Congressionally designated wilderness areas are protected by law and valued for their ecological, historical, scientific, and experiential resources. There are six designated wilderness areas on the Forest containing a total of 64,469 acres (Table 3.134) or 3.6 percent of the total Forest area. The Ouachita National Forest does not contain any wilderness study areas or recommended wilderness study areas.

Table 3.134 Designated Wilderness

Name	Acres
Caney Creek Wilderness	14,460
Dry Creek Wilderness	6,310
Poteau Mountain Wilderness	11,299
Flatside Wilderness	9,507
Black Fork Mountain Wilderness	13,139
Upper Kiamichi Wilderness	9,754
Total	64,469

The 1982 NFMA regulations direct that roadless areas within the National Forest System be “evaluated and considered for recommendation as potential wilderness areas during the forest planning process” (36 CFR 219.17). The first step in the evaluation of potential wilderness is to identify and inventory all roadless, undeveloped areas that satisfy the definition of wilderness found in Section 2 (c) of the 1964 Wilderness Act (FSH 1909.12). Roadless areas are places that have retained or are regaining a natural, untrammeled appearance, and where signs of prior human activity are disappearing or being muted by natural forces. One of the most important criteria for identifying roadless areas in the East is a road density of no more than one-half mile of improved road per 1,000 acres.

During this Forest Plan revision, a new comprehensive review was completed to identify areas that met roadless requirements and could be evaluated as potential additions to the National Wilderness Preservation System. This analysis began with the previously identified roadless areas.

Status of Former RARE II Areas

Areas previously identified as RARE II Areas (1978) were Beech Creek in LeFlore County, Oklahoma; Rich Mountain in Polk County, Arkansas and LeFlore County, Oklahoma; Bear Mountain and Little Blakely, located adjacent to Lake Ouachita in Garland County, Arkansas; and Blue Mountain in Scott and Polk Counties, Arkansas, and Brush Heap in Polk County, Arkansas.

During this Forest Plan revision, the review found that Beech Creek exceeds the criterion of no more than one-half mile of improved road per 1,000 acres. Furthermore, significant private land inholdings exist in the Beech Creek area, and many of those acres have been recently harvested. The portions of the Beech Creek area that are under Forest management—Beech Creek Botanical Area and Beech Creek Scenic Area—already have congressional designations that protect the unique values of the area. Because of the road density and private land inholdings, Beech Creek did not meet the criteria for an inventoried roadless area. Under all action alternatives, Beech Creek would remain in Management Area 19, as Beech Creek Botanical Area and Beech Creek National Scenic Area and would be managed to protect and further the scenic and botanical values identified in the legislation that designated these areas.

The Rich Mountain area exceeds the criterion of no more than one-half mile of improved road per 1,000 acres. Furthermore, the area is bounded on one side by a major US highway and by the Talimena Scenic Drive on the other, one of the most popular drives in Oklahoma and Arkansas. The area is bisected by cleared power line rights-of-way and is subject to sight and sound influences from surrounding human activity. The Oklahoma portion of this formerly listed roadless area is already a congressionally designated area (Robert S. Kerr Memorial Arboretum, Nature Center, and Botanical Area). Because of the road density and sight and sound influences from the Talimena Scenic Drive and power line rights-of-way, Rich Mountain did not meet the criteria for an inventoried roadless area. In Alternatives C, D, and E, Rich Mountain would move from Management Area 19 to Management Area 2, Special Interest Areas, where it would continue to be managed for the benefit of existing natural and botanical values of the area. In Alternatives A and B, Rich Mountain would remain in Management Area 19.

Bear Mountain failed to meet the criterion of less than one-half mile of improved road per 1,000 acres and because of unnatural sound intrusions from Lake Ouachita and adjacent land areas and was not considered an inventoried roadless area. Under alternatives B, C, D, and E, the Bear Mountain area would be managed as part of Management Area 16, Lands Surrounding Lake Ouachita and Broken Bow Lake and would continue to be managed to preserve their recreational, aesthetic, wildlife and water quality values. Under Alternative A, there would be no change from 1990 Forest Plan management.

Little Blakely was removed from consideration as an inventoried roadless area because it did not meet the criterion of having no more than one-half mile of improved road per 1,000 acres. In addition, the Little Blakely area is located adjacent to Lake Ouachita State Park and near Blakely Mountain Dam, a Corps of Engineers facility with an industrial visual quality that is not supportive of a wilderness experience. Under all alternatives, the Little Blakely area would be placed in Management Area 17, Semi-Primitive Areas, and would continue to be managed to preserve its semi-primitive character.

Portions of Blue Mountain and an expanded Brush Heap area met the roadless criteria and were reanalyzed for wilderness potential. For these two areas, a report evaluating their wilderness potential is located in Appendix G. Blue Mountain and Brush Heap would be placed in Management Area 17, Semi-Primitive Areas and would continue to be managed to preserve the semi-primitive character under Alternatives A, B, C and E. Blue Mountain and Brush Heap areas would be deferred from most timber harvest and road building for the duration of the planning cycle, with the

exception of actions necessary for forest health such as the thinning of existing pine plantations to control southern pine or Ips beetle outbreaks. Under Alternative D, these areas would be recommended for wilderness designation.

Other Areas Evaluated

The roadless analysis for this Plan revision resulted in one new area that met the inventoried roadless criteria, Irons Fork Mountain. Bee Mountain and Ashford Peak in McCurtain County, Oklahoma, were identified as inventoried roadless areas in a significant amendment to the 1990 Forest Plan in 2002 and were reviewed during this Plan revision for wilderness suitability. Finally, three potential additions to existing wilderness areas were also identified as meeting roadless criteria: Flatside Addition, Poteau Mountain Addition, and Upper Kiamichi Addition. The wilderness evaluations for these three areas are located in Appendix G.

Irons Fork Mountain would be recommended for wilderness designation in Alternative D. In Alternatives B, C, and E, it would be managed under Management Area 17, Semi-Primitive Areas and would continue to be managed to preserve the semi-primitive character. Under Alternative A, most of the area would be managed under Management Area 17; however, a portion would also be managed under Management Area 14. Under Alternatives B, C, and E, Irons Fork Mountain would be deferred from most timber harvest and road building for the duration of the planning cycle, with the exception of actions necessary for forest health such as the thinning of existing pine plantations to control southern pine or Ips beetle outbreaks. Alternative A would provide much of the same protection as B, C, and E; however, that portion in Management Area 14 would be open to road building and timber harvest.

Bee Mountain and Ashford Peak in McCurtain County, Oklahoma, were identified as inventoried roadless areas in a significant amendment to the 1990 Forest Plan completed in 2002 and were reviewed during this Plan revision for wilderness suitability. Ashford Peak and Bee Mountain are currently managed for the renewal of the Shortleaf Pine-Bluestem ecosystem and habitat for the Red-cockaded Woodpecker (*Picoides borealis*), a Forest PET species. Because the Red-cockaded Woodpecker is an Endangered species, the need to manage for continued existence of that species overrides consideration of the area for wilderness designation. Bee Mountain and Ashford Peak would be managed under Management Area 22 for all alternatives.

Wilderness Potential

Wilderness potential was analyzed in three main categories—capability, the qualities that make a roadless area suitable or not suitable for wilderness; availability, an assessment of the non-wilderness resources and demand of the area; and need, a consideration of the amount of wilderness already in the area and region (see Appendix G for the detailed analysis).

New wilderness or wilderness additions would be assigned to Management Area 1c as shown in Table 3.135. Alternatives C, D, and E all contain recommendations to add acreage to Flatside Wilderness, Poteau Mountain Wilderness, and Upper Kiamichi Wilderness. In addition, Alternative D would include new wilderness recommendations for Blue Mountain, Brush Heap Mountain, and Irons Fork Mountain. The wilderness evaluations for these areas are located in Appendix G.

Table 3.135 Allocation of Inventoried Roadless Areas to Management Areas by Alternative

Area	Alt A	Alt B	Alt C	Alt D	Alt E
Ashford Peak	MA 22	MA 22	MA 22	MA 22	MA 22
Bee Mountain	MA 22	MA 22	MA 22	MA 22	MA 22
Black Fork Mountain	MA 14	MA 17	MA 17	MA 17	MA 17
Blue Mountain	MA 14 & MA 17	MA 17	MA 17	MA 1c	MA 17
Brush Heap	MA 17 & MA 20	MA 17	MA 17	MA 1c	MA 17
Flatside Addition	MA 17	MA 17	MA 1c	MA 1c	MA 1c
Irons Fork Mountain	MA 14 & MA 17	MA 17	MA 17	MA 1c	MA 17
Poteau Mountain Addition	MA 1a	MA 1b	MA 1c	MA 1c	MA 1c
Upper Kiamichi Addition	MA 14 & MA 21	MA 14 & MA 21	MA 1c	MA 1c	MA 1c

MA_1b - Poteau Mountain Management Area.

MA 1c – Recommended Wilderness Additions. Lands are managed as if they are wilderness until released.

MA 14 – Ouachita Mountains-Habitat Diversity Emphasis. Lands are managed for multiple resource values and are subject to the full range of forest management practices, including prescribed fire, timber harvest and road construction.

MA 17 – Semi-Primitive Areas. Lands are managed to retain the semi-primitive character of the area. Most timber harvest and road construction are deferred for the planning period. Some vegetation management may occur for forest health and in existing plantation areas.

MA 20 – Wild and Scenic Corridors.

The four small areas adjacent to existing wilderness areas, Black Fork Mountain Addition, Flatside Addition, Poteau Mountain Addition (East Unit), and Upper Kiamichi Addition were considered for wilderness designation. Because of the extensive development and human activity in and around the Black Fork Addition, it was determined that this area would not be a good addition to the Black Fork Mountain Wilderness Area. Instead, the Black Fork Mountain Addition should be managed as a part of Management Area 17 in Alternatives B, C, D, and E (where lands are managed to retain the semi-primitive character of the area) and retained in Management Area 14, Ouachita Mountains, Habitat Diversity Emphasis in Alternative A.

The Flatside, Poteau Mountain, and Upper Kiamichi Additions would be recommended for wilderness designation in Alternatives C, D, and E. Under Alternatives A and B, the Flatside area would be a part of Management Area 17, and the Upper Kiamichi area would be a part of Management Area 14 and 21 where it would be managed in MA 14 for timber production and wildlife and range values and in MA 21 for old growth conditions. Under Alternative A, the Poteau Mountain Area would be a part of MA 1a, and it would be managed the same under Alternative B, although under MA 1b (because MA 1a under the 1990 Amended Plan is the same as MA 1b under Alternatives B, C, D, and E). MA 1a and 1b are managed to perpetuate the natural biophysical condition, solitude, and off-highway vehicle use.

Direct and Indirect Effects

Management direction remains essentially the same for the existing six designated wilderness areas on the Forest under all alternatives. Therefore, there would be no significant direct or indirect effects to the existing wilderness resource, regardless of alternative. Wilderness additions would be

recommended under Alternatives C and E with the addition of 620 acres to the Flatside Wilderness, 77 acres to Poteau Mountain Wilderness, and 1,096 acres to the Upper Kiamichi Wilderness. Under Alternative D, wilderness recommendations total 30,127 acres. The recommended additions would consolidate boundaries and make the existing wilderness boundaries more manageable and visible to the public. Overall, wilderness use in the Ouachita National Forest is considerably below the existing capacity. Therefore, additions for the sake of satisfying excess demand were not an issue during this plan revision. Wilderness accessibility is generally excellent for all population centers located inside the Forest's draw area. Exceptions include 43 population centers (listed in Appendix G, most of which are located at the extreme outer limit of the Forest's draw area). Although these 43 population centers lack convenient access to wilderness areas on the Ouachita National Forest, they have adequate to abundant options for wilderness experiences in other, nearby wilderness as indicated by the accessible wilderness listings for each area, also found in Appendix G. A summary of the number of areas and acres for each alternative is presented in Table 3.136.

Table 3.136 Comparison of Recommended Wilderness Acres by Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
Areas	0	0	3	6	3
Acres	0	0	1,793	30,127	1,793

Designation as recommended wilderness or wilderness additions would preserve additional areas where natural processes occur more or less unimpeded and provide additional areas for solitude and primitive recreation. These areas would be islands within the Forest where the naturalness, uniqueness, and representative ecosystems of the designated areas would be maintained. The highest priority would be to manage for the naturalness of the area.

Roadless areas that are recommended for wilderness are not available for activities such as vegetation management or road construction. These areas are managed much the same as designated wilderness until a final determination is made by Congress. One of the potential negative effects of wilderness designation or recommendations for wilderness designation is that the areas so treated may be subject to insect or disease outbreaks that, except under extraordinary circumstances, cannot be controlled and may result in devastation of forest stands or whole landscapes. To the extent that such outbreaks are natural occurrences confined to the wilderness or recommended wilderness area, the devastation may be acceptable. Where outbreaks of non-native diseases or non-native, invasive species occur in areas where they normally cannot be treated, however, there may be broader implications for ecosystem health in the National Forest as a whole.

Fire management may be affected by designation of additional wilderness areas. Fire suppression of all human-caused wildfires would minimize the potential effects on wilderness values; however, fires in these areas would likely become larger in size than they would under the 1990 Forest Plan management because of the restrictions on motorized equipment such as bulldozers. In emergency situations, mechanized equipment and motorized transport, use of helicopters, air tankers, and other aircraft may be approved by the Forest Supervisors and/or Regional Forester. These actions would impact wilderness character and visitor experiences and leave evidence of man, although rehabilitation could help to reduce those impacts afterward.

Direct effects of managing these areas as recommended wilderness include those associated with closing and rehabilitating any existing roads or, indirectly, allowing them to return to a natural state. Indirectly, water quality and air quality should remain high, and the imprint of human influence should diminish over time.

Opportunities for solitude and remoteness would increase, as would opportunities for primitive and unconfined recreation due to road closures and prohibiting motorized use. Non-motorized dispersed recreation activities such as hiking, horseback riding, camping, fishing, and hunting would continue and use levels would be expected to remain about the same as current levels. Contrasts between roadless areas and other forested lands would increase. Additional acreage for recommended wilderness would increase the Forest's wilderness carrying capacity and allow user impacts to be dispersed across a larger area, perhaps providing an increase in wilderness visitor satisfaction. However, road closures would also result in decreased access for some activities. A decrease in opportunities for bicycling, OHV riding, and other forms of recreation requiring motorized transport or mechanized equipment would result. Bicycle and motorized use would be displaced to other areas.

A total of 14.8 miles could be closed to bicycles under Alternative D, due to wilderness recommendations. Maintenance of trails and facilities, including the Ouachita National Recreation Trail, located inside any recommended wilderness area would be done using hand tools only, and access would be by non-mechanized/non-motorized means. The minor amount of motor vehicle recreation use currently taking place in these areas would cease.

Research indicates there would be increases in visitation and economic benefits resulting from tourism in the surrounding local communities. However, there could also be reductions in economic benefits associated with the management, harvesting, manufacturing, and retail sale of timber products from the roadless areas, since timber management activities would not be allowed in these areas. There would be reduced opportunities to recover commercial minerals, and mineral exploration and development would be hindered. Little or no mineral development or its associated impacts would be expected in any recommended wilderness or wilderness addition. Educational opportunities for the scientific study of natural ecological processes would increase.

The naturalness, uniqueness, and representative ecosystems of the designated areas would be maintained. Natural ecological processes would continue, including plant succession. Larger blocks of undeveloped land and reduction in open road density in areas recommended for wilderness would favor area sensitive and disturbance sensitive species. Existing old fields, wildlife openings, and other habitat improvements for fish and wildlife would not be maintained in prescriptions areas recommended for wilderness. These early successional habitat areas would succeed to forest. New permanent wildlife openings would not be created. These factors would reduce habitat for early successional species. Fish stocking in areas recommended for wilderness would be restricted to reestablishment or maintenance of indigenous, Threatened, Endangered, or Sensitive species. Rare communities and Threatened and Endangered species would be managed within the limitation of activities allowed within wilderness.

The magnitude of the wilderness recommendations in Alternatives C and E (1,793 acres in a nearly 1.8 million acre National Forest) is so slight that the potential negative effects of designation would be negligible. Alternative D would present more potential negative effects of the kinds previously described, but the magnitude of the changes would likely still be very small, because less than two percent of the National Forest would be added to the wilderness/recommended wilderness category.

Table 3.137 displays the ecosystems represented currently by designated wilderness on the Forest and those that potentially could be added as recommended wilderness.

Table 3.137 Ecological Sections and Subsections in which Wilderness (W) or Recommended Wildernesses (RW) are located on the Ouachita National Forest, by Alternative

Section/Subsection	Alternative				
	A	B	C	D	E
Ouachita Mountains/Fourche Mountains (M231Aa)	W	W	W + RW	W + RW	W + RW
Ouachita Mountains/East Central Ouachita Mountains (M231Ab)	W	W	W + RW	W + RW	W + RW
Ouachita Mountains/West Central Ouachita Mountains (M231Ac)	W	W	W + RW	W + RW	W + RW
Middle Coastal Plains, Western Section/Southern Oklahoma Subsection (231 Em)	0	0	0	0	0
Middle Coastal Plains, Western Section/Southwestern Arkansas Subsection (231 Eb)	0	0	0	0	0

Scenic Areas, Special Areas, the Ouachita National Trail, and Scenic Byways *Affected Environment*

Special interest areas are designated to protect and, where appropriate, foster public use and enjoyment of areas with scenic, historical, geological, botanical, zoological, paleontological, archeological or other characteristics. Special interest areas may be designated administratively or may receive designation by law. Other uses are permitted in these areas to the extent that these uses are in harmony with the designation. This section discusses designated Scenic Areas, Botanical Areas, and Wildlife Areas as managed under the 1990 Amended Forest Plan. Other sections of the EIS also deal with special areas. For example, outstandingly remarkable streams are reviewed under the Wild & Scenic Rivers section. Table 3.138 displays scenic areas and acreage and location of each.

Table 3.138 Scenic Areas, 1990 Forest Plan, as amended

Scenic Area	Acres	District
Beech Creek	7,500	Kiamichi Unit, Oklahoma RD
Blowout Mountain	526	Mena/Oden
Dutch Creek Mountain	624	Fourche/Cold Springs
Crystal Mountain	100	Caddo/Womble
Irons Fork	1,450	Jessieville
South Fourche	1,495	Winona
Indian Nations Scenic and Wildlife Area	41,051	Choctaw & Kiamichi Units, Oklahoma RD
TOTALS	52,746	Acres

Scenic Areas

Beech Creek National Scenic Area includes the 7,500 acres that constitute the headwaters of Beech Creek. Located in the southernmost designated area of the Winding Stair Mountain National Recreation Area complex, the area offers special opportunities to enjoy solitude or a primitive, unconfined type of recreation. No developed recreation facilities are found here and there are few, if any, directional or information signs. Mountain bikes, hang gliders, and motorized vehicles are not permitted.

Blowout Mountain Scenic Area is located north of Mt. Ida, Arkansas, on either side of US Highway 270 just east of the Big Brushy Recreation Area. Blowout Mountain is noted for its stands of mature growth pine and the vistas afforded from overlooks from Highway 270 on the Mena/Oden Ranger District.

Dutch Creek Mountain Scenic Area is known for large old growth pine and hardwood timber and related plant and animal species. It is located to the south of Arkansas Highway 80, west of Blue Ball. The Scenic area is located primarily on the Fourche Ranger District; however, a portion of the area is located across the District boundary line on the Poteau/Cold Springs Ranger District.

Crystal Mountain Scenic Area, also known as Crystal Scenic, is located on either side of Forest Road 177, primarily on the Caddo Ranger District, approximately two and one-half miles west of the intersection of Montgomery county Road 28 and Forest Road 177. The area contains large mature growth short-leaf pine.

Irons Fork Scenic Area is located on the Jessieville/Winona Ranger District approximately two miles south of Aly in Yell County and is bounded by Arkansas Highway 27 to the west and Forest Roads 11 (north) and 148 (south). Irons Fork contains unusually long placid pools within the drainage of Irons Fork Creek and characteristic hardwood tree species on the north slopes and pine on the south. The Ouachita National Recreation Trail passes through this Scenic Area.

South Fourche Scenic Area is contained in two separate parcels along the South Fourche La Fave River, a popular floating stream. Cove Creek Lake bounds the south side of the north unit of South Fourche Scenic Area and Cedar Lake is located just upstream of the south unit. Discoveries of rare plants and habitats have led to consideration of this area as a Botanical Area.

Indian Nations Scenic and Wildlife Area, 41,409 acres located adjacent to the Oklahoma – Arkansas State Line, is divided along its length by the Winding Stair National Recreation Area and the Talimena Scenic Drive. This area supports a relatively natural mixed hardwood and shortleaf pine forest. Mast production and den trees for wildlife are numerous. Recreational opportunities include hiking and equestrian trails, fishing at two small manmade lakes, two walk-in turkey areas, several hunting camps along Holson Valley Road, and areas of historical and interpretive interest such as a pioneer cemetery and pioneer homesteads.

Other Special Areas

Rich Mountain Recreation Area, located in Arkansas adjacent to the Arkansas – Oklahoma state line, is a 12,980 acre, primarily primitive, recreation area located atop Rich Mountain. The recreation area parallels the Talimena Scenic Drive, which is located on the north side of the area. Hiking, nature study, and spectacular views from the top of Rich Mountain to the south are all featured in this area.

Rich Mountain Botanical Area, located across the Talimena Scenic Drive from the Rich Mountain Recreation Area is composed of 3,200 acres managed for recreation and scenic and wildlife values. Located atop Rich Mountain in Arkansas at the Arkansas–Oklahoma state line, this area is vegetated with native hardwood species along the Talimena Scenic Drive and a mixed forest condition in the remaining areas. Rich Mountain Botanical Area is part of a larger complex of recreation and botanical areas showcasing the unique features of Rich Mountain.

Beech Creek Botanical Area, a 400-acre inclusion located completely within Beech Creek Scenic Area, is comprised of stands of mature beech trees unique to the area. The Beech Creek Botanical Area is situated in a narrow band along the shores of Beech Creek with scattered beech trees located within the immediate, adjacent forest.

Richardson Bottoms Wildlife Viewing Area. Richardson Bottoms was originally a moist hardwood forest, logged the area in the early 1980s. The area was subsequently planted with loblolly pine to create a pine plantation. Beavers cut the pine saplings and built a series of dams along a seasonal stream leading into Irons Fork and created a 100-acre wetland, unique to the Ouachitas. The area is located on the Jessieville/Winona Ranger District west of Jessieville. Facilities include a parking area, trails, and interpretive displays to enhance wildlife viewing opportunities for the public.

Red Slough Wildlife Area, a 5,814-acre wetland is located on the Tiak Ranger District in southeastern Oklahoma near the Red River. The wetland is composed of mudflats, emergent marshes, shallow and deep pools, riparian areas, bottom land hardwood, scrub/shrub wetlands, and wet prairies. A premier bird and wildlife area, Red Slough is managed by the Forest Service, Natural Resources Conservation Service, and the Oklahoma Department of Wildlife Conservation.

The Ouachita National Trail and Scenic Byways

The Ouachita National Trail, Arkansas Scenic Byway 7, Talimena Scenic Drive, Mountain Pass Scenic Drive, and Mountain Gateway Scenic Drive are linear features with scenic qualities managed under the 1990 Forest Plan to preserve or enhance their visual condition.

Ouachita National Recreation Trail – The Ouachita National Recreation Trail (ONRT), established by the Chief of the Forest Service in September 1978, traverses the Forest from east to west approximately in its geographic center. The ONRT, located in both Arkansas and Oklahoma, is 223 miles long, 192 miles of which are situated on the Ouachita National Forest. In the west, the trail begins at Talimena State Park on U.S. Hwy. 271 near Talihina, Oklahoma. The eastern boundary is south of Perryville, Arkansas on Hwy. 9. Another 31 miles of trail, located on private and other public lands, extends to Pinnacle Mountain State Park, 15 miles west of Little Rock, Arkansas. Elevations range from 600 to 2,600 feet as the trail passes through forested mountains, across sweeping valleys and near clear-running streams. Spur trails connect to various recreation areas and points of interest. Numerous road crossings and access points provide opportunities for point-to-point hikes of various distances. In 2001, 137 miles of the trail were opened to mountain bike use.

Two National Forest Scenic Byways are found within the boundaries of the Ouachita National Forest: Arkansas State Highway 7 Scenic Byway traverses the Forest from north to south, and the Talimena Scenic Drive, located in both Arkansas and Oklahoma, crosses the westernmost part of the Forest from east to west.

Arkansas Scenic Byway 7, a State of Arkansas and US Forest Service Scenic Byway, extends approximately 21 miles from the Forest's south boundary near Iron Springs Recreation Area to the point where the Byway leaves the Forest near Fourche Junction (junction of Arkansas Highways 7

and 10) to the north. The drive affords motorists panoramic views of the Ouachita Mountains and forests and provides spectacular vistas of the Ouachita Forest's landscape, including annual displays of spring wildflowers and fall foliage.

Talimena Scenic Drive, located in both Arkansas (17 Miles) and Oklahoma (37 miles) straddles the crest of Rich Mountain in the Western Ouachita Mountains for 54 miles and is both a National Scenic Byway and also a US Forest Service Scenic Byway. The Talimena Drive affords visitors opportunities for viewing extended vistas, outdoor recreation, and natural and cultural feature interpretation. The Byway begins in Oklahoma at the Talihina Visitor Center, parallels a part of the Ouachita National Recreation Trail, and skirts the Robert S. Kerr Memorial Arboretum and Nature Center to the north and Upper Kiamichi Wilderness Area to the south before entering Arkansas. In Arkansas, the Byway parallels Rich Mountain Recreation Area to the south and Rich Mountain Botanical Area to the north, ending at the Mena Visitor Center near Mena, Arkansas.

The **Mountain Pass Scenic Drive** is that part of Hwy. 259 from Octavia north to its junction with Hwy. 59 at Page, Oklahoma. Sixteen miles of the total 23 mile Mountain Pass Scenic Drive are located within the Forest boundary. The **Mountain Gateway Scenic Drive** is a portion of Highway 59 from the Arkansas state line to the east side of Heavener. Sixteen miles of this scenic drive are located within the Forest boundary. Efforts are currently under way to gain designation of both routes as National Scenic Byways.

Direct and Indirect and Cumulative Effects

No alternative proposes new scenic areas or scenic byways. Under Alternatives B, C, D, and E, a new category of watchable wildlife areas was created to give special recognition to several deserving areas. None of the existing special areas would be deleted in any alternative, and under Alternative E, the South Fourche Scenic Area would be expanded and managed as a Botanical Area. Rich Mountain Botanical Area would move from Management Area 19(d) to Management Area 2c and Rich Mountain Recreation Area would move from 19(b) to Management Area 2d, under Alternatives B, C, D, and E; and no changes in management would be made. The change from Management Area 19 to Management Area 2 is to remove areas within Management Area 19 that were not a part of the Winding Stair Mountain National Recreation and Wilderness Area Act of 1988.

Alternative E would propose to add a new Botanical Area consisting of the existing South Fourche Scenic Area plus 1,095 additional acres to Management Area 2c, Botanical Areas. The South Fourche Botanical Area would be recommended due to globally rare plant species, a perched wetland, a saltlick, and an herbaceous marsh. South Fourche, under the 1990 Amended Forest Plan is managed under a desired condition that calls for a natural landscape accessible by trails and/or nearby roads. Under Alternative E, upland areas would be treated periodically with prescribed fire and could be thinned or regenerated to restore native vegetation or specific habitats. Such management would represent a change from the 1990 Amended Forest Plan where the entire scenic area is treated as off limits to timber harvest.

Scenic qualities of the Ouachita National Trail, Arkansas Scenic Byway 7, Talimena Scenic Drive, Mountain Pass Scenic Drive, and Mountain Gateway Scenic Drive would continue to be protected in Alternatives B, C, D, and E by use of the Scenery Management System, but not under a separate Management Area. The Scenery Management System would provide protection to high concern level travel routes such as these.

Under Alternative E, Management Area 2 would be increased by adding Rich Mountain Botanical Area, Rich Mountain Recreation Area, a new category, watchable wildlife areas, and 1,095 acres to the South Fourche area. Under Alternatives B, C, and D the same changes would be incorporated,

without the addition of the South Fourche Botanical Area. Although the overall size of MA 2 would increase under all alternatives, except A, management of these special areas would change little. The changes in management represent no major changes from the 1990 Amended Forest Plan. Because treatment of these would not change markedly under any alternative, cumulative effects are considered to be relatively minor.

Research Natural Areas

According to the Forest Service Manual (FSM 4060), "Research natural areas are part of a national network of ecological areas designated in perpetuity for research and education and/or to maintain biological diversity on National Forest System lands. Research natural areas are for nonmanipulative research, observation, and study." There are four designated Research Natural Areas (RNAs) on the Ouachita National Forest—Lake Winona RNA, Roaring Branch RNA, Tiak RNA, and Gap Creek RNA—and one candidate area, described as follows.

The 1990 Amended Forest Plan identified the R.R. Reynolds area as a candidate research natural area and allocated it to Management Area 4 (Research Natural Areas and National Natural Landmarks) in Amendment 14 (dated 4/05/94) to that Plan. The accompanying environmental assessment (EA) analyzed the environmental consequences of this re-allocation of land from Crossett Experimental Forest (part of Management Area 3) to Management Area 4; the EA is incorporated by reference.

Amendment 14 to the 1990 Amended Forest Plan came about after the Forest Supervisor's staff and Southern Research Station scientists completed a study of this 80-acre unmanaged natural area, which is characterized by relatively undisturbed loblolly pine-hardwood forest. The study analyzed this area for inclusion in the national network of RNAs, using the factors listed in 36 CFR 219.25 and FSM 4063.4, and determined that the area was suitable as an RNA. No further action was taken until recently, when the Southern Research Station re-affirmed its interest in seeing this area become a formally designated RNA.

Wild and Scenic Rivers

The Wild and Scenic Rivers Act (Public Law 90-542: 16 USC 1271-1287, October 2, 1968) and its amendments provide for the protection of selected rivers and their immediate environments. To be eligible for designation, rivers must possess one or more outstandingly remarkable values such as scenic, recreational, geologic, fish and wildlife, historic, cultural, or other values. Designation preserves rivers in free-flowing condition, protects water quality, and protects their immediate environments for the benefit and enjoyment of present and future generations.

Most rivers are added to the National Wild and Scenic Rivers (WSR) System through federal legislation after a study of the river's eligibility and suitability for designation. The Forest Service is required to consider and evaluate rivers on lands they manage for potential designation while preparing their broader Land and Resource Management Plans under Section 5(d)(1) of the Act.

Rivers and stream corridors accommodate uses such as picnicking, fishing, sightseeing, day hiking and walking for pleasure; developed and primitive camping, boating (canoeing, kayaking, rafting, tubing), swimming, and nature study. The National Survey on Recreation and the Environment 2000 interviewed over 15,000 people to determine participation in a variety of activities. According to the results, 76.1 million Americans reported participating in boating (including rafting, kayaking, and canoeing), and 20 million participated in rafting, tubing, or other types of floating on flowing waters.

According to the Ozark-Ouachita Highlands Assessment Social and Economic Conditions Report (1999), trends in water based activities participation - including such rivers and streams as listed above - are projected to increase into the year 2010. The largest increases in participation over this period are projected to occur in pleasure sightseeing (25 percent), developed camping (22 percent), picnicking (21 percent), and visiting beach or water sites (20 percent).

Demand for WSR designation is expressed primarily through public comment and responses to agency proposals. The degree to which public input favors designation indicates the demand for a wide range of uses, activities, and resources qualities associated with WSR management. Although demand is closely related to the current population and the projected growth of the local area, WSR designation would likely produce increased levels of recreation use in designated corridors.

The Ouachita National Forest contains two Wild and Scenic Rivers, the Little Missouri River (15.7 miles) and the Cossatot River (15.5 miles). These two Wild and Scenic Rivers total 31.2 miles in combined length and are managed by the Forest Service – 4.4 miles are classified as wild, 22.6 as scenic and 4.2 miles as recreational. The Cossatot Wild and Scenic River contains an additional segment that is located outside the Forest boundary and is managed by the Division of State Parks, Arkansas Department of Parks and Tourism, and the US Army Corps of Engineers.

Table 3.139 identifies the designations of each existing Wild and Scenic River by section.

Table 3.139 Existing Wild and Scenic Rivers on the Ouachita National Forest

River and Segments	County	Miles	Classification
Cossatot			
Segment A ¹	Polk	4.2	Recreational
Segment B ¹	Polk	6.9	Scenic
Segment C ¹	Polk	4.4	Scenic
Little Missouri			
Segment I	Polk and Montgomery	11.3	Scenic
Segment III	Polk and Montgomery	4.4	Wild

¹ Cossatot Wild and Scenic River Segment designations were changed in this document to avoid confusion when comparing the 1990 Amended Plan designations, which used Roman numerals to designate proposed segments, and the current congressionally designated segments of the Cossatot WSR. Segments designated with A, B and/or C represent current congressionally authorized and designated additions to the National Wild and Scenic River System.

An inventory and analysis of streams potentially eligible for the National Wild and Scenic River System was completed as part of the 1990 Amended Forest Plan. In that plan, fifteen separate waterways were reviewed for eligibility and suitability using criteria established in the Wild and Scenic Rivers Act and the Final Revised Guidelines for Eligibility, Classification, and Management of River Areas.

In addition to the Cossatot, Little Missouri, Saline, and Ouachita Rivers, which are listed on the National Park Service's National Rivers Inventory (NRI), the Ouachita National Forest reviewed eleven additional streams identified during the previous Forest planning process for eligibility and suitability. The Caddo, Little Cedar Creek and Cedar Creek, Mill Creek, Fourche La Fave, South Fourche La Fave, and Clearfork (all in Arkansas); and the Kiamichi River, Beech Creek, Billy Creek, and Little Cedar Creek (in Oklahoma) were reviewed for Wild and Scenic designation. The Ouachita and Saline Rivers were found to be eligible under this analysis. However, the minimal Federal land

ownership of the corridor of each of these two rivers has shifted the sponsorship of a formal designation request from the Forest Service to the State of Arkansas. To date, no formal request by the State has been made to incorporate the Ouachita and Saline Rivers into the National System. The remainder of the streams that were identified and reviewed were found not to contain outstandingly remarkable values (ORV) and were not found to be eligible for recommendation. No waterways on the Ouachita National Forest were designated as Congressional Study Rivers.

In January 2002, the Ouachita National Forest completed a significant amendment to the Land and Resource Management Plan for acquired lands located in McCurtain County, in southeastern Oklahoma. An EIS was prepared to analyze alternatives for amending the existing plan to allocate these lands to Forest management areas. The amendment also addressed qualifications of the Glover and Mountain Fork Rivers, both listed on the NRI, for possible recommendation as Wild and Scenic Rivers. The State of Oklahoma had previously designated the segment of the Mountain Fork River from upper Broken Bow Lake to the Oklahoma – Arkansas state line as scenic under the Oklahoma Scenic Rivers Act of 1970.

The study found the Glover River, Segment I (from the confluence of East and West Forks to the National Forest boundary – 16.5 miles) to qualify for eligibility as a scenic river. Segment II of the Glover River (that part of the river beyond the current National Forest boundary to the confluence with Little River, 15.5 miles) is located outside the National Forest boundary, and the study recommended that this segment be studied for possible Wild and Scenic River designation by the appropriate state agency.

The Mountain Fork River, Segment I (15.9 miles, starting at the Oklahoma – Arkansas state line and ending downstream at the bridge on Oklahoma State Highway 4 is in private ownership and the study recommended that this segment be studied by the appropriate state agency to determine qualification for inclusion. Segment II of the Mountain Fork (9.1 miles long starting at the bridge on Oklahoma State Highway 4, and ending at the upper end of Broken Bow Lake) was found to be eligible for designation as scenic, due to its outstandingly remarkable scenic, recreational, fish and wildlife, geological, and archaeological/historic values. Segment II contains only 2.3 miles of National Forest System land within its 9.1-mile length. Therefore, the study recommended that this segment be studied by the appropriate state agency to determine its qualification. Segment III (from Broken Bow Dam to U.S. Highway 70), of the river was deemed ineligible since it is not considered free flowing.

No other rivers or streams were identified for study as potential Wild and Scenic Rivers during the analysis and public involvement phases of Plan revision.

The 1986 Land and Resource Management Plan (Forest Plan) has been amended over 40 times since the Plan was written. During that time, changes to the Forest Plan have been made when conditions changed or when new requirements or adaptations to existing requirements made the Forest Plan outdated or incomplete. The rivers and streams which were first studied during the years since the first Plan was written and then amended to include the McCurtain County, Oklahoma lands, have all been managed to maintain the values that were evaluated in the first Wild and Scenic River studies. These streams and rivers and their riparian corridors have been left to evolve naturally without the interference of most human-caused activity. The results of the original findings for the rivers and streams under the original EIS and the Acquired Lands in Southeastern Oklahoma EIS remain essentially the same. No new streams have been identified either by the Forest or the public that should be studied. No additional land acquisitions have been made by the Forest Service that would better qualify lands over which the Forest had no control in the original plan to be found eligible now by virtue of land ownership alone. And, conditions have not changed appreciably in any of these streams since the last analysis was completed. Therefore, there is no

proposal to change recommendations previously made or to make new recommendations for streams to be afforded wild and scenic status in Alternatives B, C, D, and E.

Direct and Indirect and Cumulative Effects

Eligible Rivers

The identification of a river for study through the forest planning process does not trigger any protection under the Act until designation by Congress. Identifying rivers as eligible, or eligible and suitable, does not create any new agency authority; rather, it focuses the management actions within the discretion of the Forest Service on protecting identified river values. For agency-identified study rivers, the preliminary (inventoried) classification is to be maintained absent a suitability determination that recommends a classification other than the preliminary classification. The recommended classification is to be maintained throughout the duration of the forest plan. Table 3.140 describes the eligible river segments and their classifications. Until designation decisions are made or additional river studies are completed, National Forest System lands associated with eligible river corridors will be managed to perpetuate their eligibility for designation within the Management Area for Wild and Scenic River corridors. Management activities that enhance conditions consistent with maintaining the eligibility of the subject river corridors may be allowed.

Table 3.140 Eligible Rivers Tentative Classification (Miles shown are NFS lands)

River/Segments	County	Miles	Classification	Recommending Authority
Little Missouri River Segment II;	Montgomery, AR	2.3	Recreational	State of Arkansas
Ouachita River, Segment I	Polk, AR	7.6	Recreational	State of Arkansas
Ouachita River, Segment III	Montgomery, AR	28.0	Recreational	State of Arkansas
North Fork of the Saline River Segment I	Saline, AR	2.4	Recreational	State of Arkansas
North Fork of the Saline River Segment III	Saline, AR	1.6	Recreational	State of Arkansas
North Fork of the Saline River Segment IV	Saline, AR	2.0	Recreational	State of Arkansas
Middle Fork of the Saline River	Saline, AR	3.2	Recreational	State of Arkansas
Ouachita River, Segment IV	Montgomery, AR	15.3	Scenic	State of Arkansas
Glover River, Segment I	McCurtain, OK	16.5	Scenic	Forest Service
North Fork of the Saline River Segment II	Saline, AR	3.8	Scenic	State of Arkansas
Alum Fork of the Saline River	Saline, AR	3.9	Scenic	State of Arkansas
Glover River, Segment II	McCurtain, OK	15.5	Scenic	State of Oklahoma
Mountain Fork River, Segment II	McCurtain, OK	9.1	Scenic	State of Oklahoma
Caddo River	Montgomery, AR	25.2	Recreational	State of Arkansas

Management emphasis for the rivers and corridors is focused on protection and enhancement of the values for which they were established, without limiting other uses that do not substantially interfere with public use and enjoyment of those values. The establishment values include: wildlife, recreation, geological, archaeological, and scenic values. The number of eligible river miles remains constant in all alternatives.

Development along rivers and streams is not only reducing water quality and habitat on many rivers, but limiting public access for fishing and other river-related activities. Protection of rivers and streams through the forest planning process helps to assure high quality, free flowing rivers and streams, as well as river-related recreation opportunities.

Non-eligible Rivers

All rivers assessed and found non-eligible for recommendation as additions to the National System of Wild and Scenic Rivers, will be returned to the general forest area and their appropriate management area and managed under the requirements as stated for that MA. The non-eligible river segments will generally be found in MA 9 – Water and Riparian Communities, and will be managed for the benefit of a wide range of plant and animal species, riparian habitat and for general water quality. Non-eligible rivers are listed in Table 3.141.

Table 3.141 Rivers Reviewed and Found To Be Not Eligible

River and Segment	County	Miles	Determination Findings	Remarks
Little Cedar Creek	Perry & Saline, AR	5.5	No ORVs	Portions located inside Flatside Wilderness
Cedar Creek	Perry, AR	11.3	No ORVs	Portions located inside South Fourche Scenic Area
South Fourche La Fave River	Yell & Perry, AR	40.4	No ORVs	Forest lands adjoin for 9.1 of 40.4 study miles
Mill Creek	Scott, AR	15.8	No ORVs	Forest lands adjoin 8.1 of 15.8 miles
Clear Fork and Black Fork, Headwaters of Fourche La Fave River	Scott & Polk, AR	15.8	No ORVs	Forest lands adjoin 5.5 of 15.8 study miles
Fourche La Fave River, Segment I	Scott & Yell, AR	60.5	No ORVs	Forest lands adjoin 5.9 of 60.5 study miles
Fourche La Fave River, Segment II	Yell & Perry, AR	25.0	Not Free-flowing	Not considered further
Fourche La Fave River, Segment III	Perry, AR	28.4	No ORVs	Forest lands adjoin 0.4 mile of 28.4 study miles
Kiamichi River	Le Flore, OK	12.5	No ORVs	Forest lands adjoin 8.8 miles of 12.5 study miles
Beech Creek	Le Flore, OK	8.9	No ORVs	Forest lands adjoin 5.4 miles of 8.9 study miles
Little Cedar Creek (OK)	Le Flore, OK	4.0	No ORVs	Forest lands adjoin 2.8 miles of 4.0 study miles
Billy Creek	Le Flore, OK	4.3	No ORVs	Forest lands adjoin 3.5 miles of 4.3 study miles

The complete analysis and findings of eligibility studies as well as Wild and Scenic River Studies for the Little Missouri and Cossatot Rivers can be found in the Final Supplement to the Final Environmental Impact Statement, Land and Resource Management Plan, Ouachita National Forest, March 1990, Appendix E.

Military Use

Affected Environment

Over the last three decades, National Guard and Army Reserve units have used the Forest for military readiness activities. Permission for such use is statutorily authorized, but use of National Forest System lands for military training activities is permissible only if lands within the control of the Department of Defense are not available or suitable for the proposed training activities. Current direction is to issue special use permits to the National Guard and agreements to the Army Reserve for low impact military readiness activities if such use is compatible with other resource uses and meets other environmental requirements, as documented in an environmental review following NEPA procedures.

Military units use the Forest as a training ground for such activities as overnight survival training and orienteering in adverse conditions. Because the Forest contains rugged terrain, it has also been used as a training area for setting up mobile radio communication exercises. Occasional use of the Forest allows defense agencies to conduct training exercises in new and unfamiliar terrain.

In addition to being approved only after appropriate NEPA review, the special-use permits contain terms and conditions that specify the scope of the activity, precautions and prohibitions. The Forest Service requires that the requesting unit be aware of and respect private ownerships that are intermingled with Forest ownership. The permit holder is responsible for all costs associated with rehabilitation, repair, or replacement of damaged Forest resources.

During some past military exercises on the Forest, residents expressed concern over helicopter use, and for this reason, the Forest does not allow the establishment of ground bases, even on a temporary basis, for readiness training for military air operations. It is not possible to prohibit military use of air space over the Forest.

Direct, Indirect, and Cumulative Effects

To date, there has been only minor use of the Forest for military readiness activities. In addition, Forest use for such activities is temporary, only for short periods of time, and approved only after environmental and special use permit review. Future military use would not vary in response to the alternatives considered in this environmental impact statement.

Other Effects

Unavoidable Adverse Effects

Each alternative has the potential to result in some adverse environmental effects that cannot be avoided or mitigated, although all alternatives are designed to avoid adverse impacts, where possible. The Forest addresses impacts by assessing the potential for impact from each alternative when compared to current conditions and setting out standards that are required to be met before any project-level action takes place. The application of standards, best management practices, and monitoring and evaluation are intended to limit the extent, severity, and duration of these effects.

Some adverse effects are temporary or transitory in nature. For example, air quality could be diminished on a recurring, though temporary, basis due to the use of prescribed fire for various purposes. Although standards require prescribed fires to be scheduled at times when weather conditions would provide for smoke dispersion, the presence of smoke and haze over or adjacent to the Forest would detract from some people's expectation of clean air. Other localized effects to air

quality that are temporary and cannot be mitigated would be expected from recreation traffic, timber hauling, and the operation of other internal combustion engines.

Portions of the natural landscape would appear altered by management activities, particularly where activity is highly visible from travel routes. Prescribed fire in forest communities including subsequent blackened tree trunks and forest floors would also be apparent. These temporary adverse effects would eventually be reduced by regrowth of vegetation and weathering. Other impacts on the natural appearance of the landscape include roads and certain recreational structures that are highly visible despite efforts to blend them with landforms and mitigate the effect by landscaping.

In inventoried roadless areas, management activities such as wildlife habitat manipulations and some associated temporary road construction, recreational trail construction or use, or other activities could have an adverse effect on the potential future designation of these areas as wilderness, research natural areas, or other purposes requiring natural characteristics.

Both the amount and distribution of mature stands could be changed through implementation of any alternative. The rate and intensity of impacts varies by alternative. Some wildlife species rely on habitat conditions provided by late successional habitats; thus, a reduction or shift in the populations (range) of some wildlife species and an increase or expansion in the population or range of others can be expected.

Disturbance, displacement, or loss of fish and wildlife and their habitats may occur as a consequence of increased management activity or even from increased human recreational activity. Roads and their associated use can impact fish and wildlife by fragmenting habitat, increasing human presence (disturbance) and by increasing sediment runoff. Improved access for timber management, special uses, or access to private lands would have similar effects.

Although standards, BMPs, and monitoring plans are designed to prevent significant impacts on soil and water, the potential for impacts does exist. Sediment production could exceed natural rates in locations where roads are being built or maintained, management activities that include harvesting of timber take place, dispersed and developed recreation continues along riparian corridors, and forest communities/habitats are restored.

Relationship between Short-Term Uses and Long-Term Productivity

NEPA requires consideration of the "relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). As declared by Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

The relationship between the short-term uses of man's environment and the maintenance and enhancement of long-term productivity is complex. Short-term uses are those that generally occur annually on parts of the Forest, such as prescribed fire and dispersed recreational camping.

Long-term means longer than a 10-year period, and productivity is the capability of the land to provide market and amenity outputs and values for future generations. Soil and water are the primary factors for productivity and represent the relationship between short-term uses and long-term productivity. The quality of life for future generations would be determined by the capability of

the land to maintain its productivity. By law, the Forest Service must ensure that land allocations and permitted activities do not significantly impair the long-term productivity of the land.

The alternatives considered in detail, including the Selected Alternative, incorporate the concept of sustained yield of resource outputs while maintaining the productivity of all resources. The specific direction and mitigation measures included in the forest-wide management standards ensure that long-term productivity would not be impaired by the application of short-term management practices. Each alternative was analyzed using the SPECTRUM linear programming model (see Appendix B), and long-term productivity of the Forest's ecosystems was considered for all alternatives.

As stated earlier, the effects of short-term or long-term uses are extremely complex and depend on management objectives and the resources that are emphasized. None of the alternatives discussed in detail would be detrimental to the long-range productivity of the Ouachita National Forest.

Conditions of management areas and the effects of implementing the Revised Forest Plan would be monitored to provide data that ensure standards for long-term productivity are met. Monitoring requirements and standards would be common to all alternatives and are included in the Revised Forest Plan.

Irreversible/Irretrievable Commitment of Resources

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line, ROW, or road. An irreversible commitment of resources results from a decision to use or modify resources that is renewable only over a long period of time, such as soil productivity, nonrenewable resources, cultural resources, or minerals. The Selected Alternative and the other alternatives examined were all based on the principles of multiple use and long-term productivity for all resources. Measures to protect natural resources that could be irreversibly affected by management activities were incorporated into forest-wide standards.

Irretrievable commitment of resources is the production of renewable resources lost due to allocation decisions that forgo the production or use of renewable resources. Allocation decisions that do not allow for the production or use of most renewable resources for relatively long periods of time include those that establish wilderness, scenic areas, wild and scenic rivers, recreation sites, and the construction of new roads. The total number of acres committed to these uses does not vary significantly among alternatives, although the types of allocated uses vary. By contrast, non-wilderness allocation for areas is considered an irretrievable loss of increased wilderness opportunities. Tradeoffs between wilderness, roadless, and other uses are discussed previously in Chapter 3.

Under a given alternative, differences between output levels and the higher levels that otherwise could be produced also represent irretrievable commitment of resources. For example, a low level of forage use for livestock grazing or a low level of timber yield could be increased in the future, based on different management prescriptions, but the outputs between now and then would be "lost" or not available for use. The production thus lost would be irretrievable, but the action is not irreversible.

Archeological resources are nonrenewable and irreplaceable. Once disturbed, the impacted portion of a property cannot be replaced or repaired, even though controlled data recording techniques may recover part of the information contained in the damaged site. Archeological surveys and evaluations routinely use small shovel tests or larger excavations to address research designs or

the potential to contain important information. These excavations are necessary to document the resource, but at the same time, such excavations are destructive (although in a controlled manner) to all or portions of archeological sites. The effects of such excavations are an irreversible effect. This is balanced by using conventional, accepted, and detailed archeological techniques and methods with a commitment to high standards. Any other resource management action or result, whether planned or inadvertent, that diminishes the character or integrity of a heritage property, has irreversibly committed a portion of that site's value.

Incomplete or Unavailable Information

The Ouachita National Forest has used the most current scientific information available and state-of-the art analytical tools to evaluate management activities and to estimate their environmental effects. However, gaps exist in our knowledge. The Council on Environmental Quality regulations describe the process for evaluating incomplete and unavailable information (40 CFR 1502.22 (a) and (b)). Incomplete or unavailable information relevant to reasonably foreseeable significant adverse impacts is noted in this chapter, where applicable, for each resource. Forest Plan monitoring is designed to evaluate assumptions and predicted effects. Should new information become available, the need to change management direction or amend the Forest Plan would be determined through the monitoring and evaluation process.

Environmental Justice

Concerns about environmental justice center on equity and fairness in resource decision-making. As required by Executive Order 12898, all federal actions must consider potentially disproportionate effects on minority or low-income communities. Principles for considering environmental justice are outlined in Environmental Justice Guidance under the National Environmental Policy Act (Council on Environmental Quality 1997). Those principles were considered in this analysis.

Environmental Justice issues are typically found in connection with proposals having adverse environmental effects that may affect public health. These kinds of effects are less likely in a Forest Plan decision because such decisions normally do not include site-specific projects or effects.

The Economic and Social Environment section discusses the demographic patterns of potentially affected minority and low-income populations and the environmental effects of the alternatives. There are no disproportionately adverse environmental or health effects on low-income or minority populations, regardless of alternative. Public involvement during plan revision was inclusive (see Appendix A).

Chapter 4 – List of the Preparers of this Final Environmental Impact Statement

The Forest Service employees who prepared this EIS are listed below in alphabetical order:

Jim Burton—Fire Team Leader
Alan Clingenpeel—Forest Hydrologist
Jack Cowart—GIS Specialist
Betty Crump—Plan Revision Ecologist
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Richard Standage—Forest Fisheries Biologist
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Ray Yelverton—Sales Forester

Chapter 5 – Distribution List

Copies of the EIS were distributed to the following individuals from the Ouachita National Forest's Plan Revision mailing list who requested particular formats of the documents (as of September 9, 2005). Individuals who did not make such a request received notification of document availability.

Individuals

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Doyle Rowland
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Juanita Turner
Jack Upchurch
Carroll E. Walls, Sr.
M. Walston
James Watson
Dennis Weaver
John Wehunt
Beth Welna
J.L. Weston
Bo White
Charline White
Michael White
Don White, Jr.
Don Whitlow
J. Wilke
Paul Wilkins
Chuck Williams
Jerry Williams
Paul Williams
Dennis Wilson
Steve Wilson
Paul Wise
Charles Wood
James Wood
James Woods
Mark Wooten
Henry Wright
George Wynne, II
Terrie Yandell
Charles Young
Cyrus Young
Douglas Zollner

Distribution List – Governments, Agencies, and Other Organizations

Native American

Caddo Indian Tribe of Oklahoma
Cherokee Nation of Oklahoma
Chickasaw Nation of Oklahoma
Choctaw Nation of Oklahoma
Muscogee Creek Nation Tribe of Oklahoma
Osage Tribe of Oklahoma
Quapaw Tribe of Oklahoma
Seminole Tribe of Oklahoma
Wichita and Affiliated Tribes of Oklahoma

Federal Agencies

Advisory Council on Historic Preservation
Department of Army
Environmental Protection Agency
Federal Aviation Administration
Federal Highway Administration
Natural Resources Conservation Service
Rural Utilities Service
U.S. Air Force
U.S. Army Corp of Engineers
U.S. Department of Transportation
U.S. Navy
USDA Forest Service
USDA, National Agricultural Library
USDI Bureau of Land Management
USDI Department of the Interior
USDI Fish and Wildlife Service
USDI Geological Survey
USDI National Park Service

Distribution List – Governments, Agencies, and Other Organizations

Elected Officials

Arkansas

Honorable Blanche Lincoln
Honorable Mark Pryor
Honorable Marion Berry
Honorable Vic Snyder
Honorable John Boozman
Honorable Mike Ross

Oklahoma

Honorable Don Nickles
Honorable James Inhofe
Honorable Tom Coburn
Honorable John Sullivan
Honorable Tom Cole
Honorable Frank Lucas

State Government Agencies

Arkansas Archeological Survey
Arkansas Coop Extension Service
Arkansas Department of Environmental Quality
Arkansas Department of Highway & Transportation
Arkansas Department of Parks & Tourism
Arkansas Forestry Commission
Arkansas Game & Fish Commission
Arkansas Geological Commission
Arkansas Natural Heritage Commission
Arkansas Natural Scenic Rivers Commission
Arkansas State Clearing House
Arkansas State Plant Board
Oklahoma Archeological Survey
Oklahoma Conservation Commission
Oklahoma Department of Agriculture
Oklahoma Department of Commerce
Oklahoma Department of Environmental Quality
Oklahoma Department of Tourism and Recreation
Oklahoma Department of Transportation
Oklahoma Department of Wildlife Conservation
Oklahoma Forestry Association
Oklahoma Geological Survey
Oklahoma Native Plant Society
Oklahoma Scenic Rivers Commission

Distribution List – Governments, Agencies, and Other Organizations

Local/Regional Government Entities

Arkansas

Governor of Arkansas
Ashley County Judge
Garland County Judge
Hot Spring County Judge
Howard County Judge
Logan County Judge
Montgomery County Judge
Perry County Judge
Pike County Judge
Polk County Judge
Saline County Judge
Scott County Judge
Sebastian County Judge
Yell County Judge

Oklahoma

Governor of Oklahoma
LeFlore County Commissioners
McCurtain County Commissioners

Public Libraries

Booneville Public Library
Broken Bow Public Library
Buckley Public Library – Poteau
Crossett Public Library
Garland County Public Library
Glenwood Branch Library
Heavener Public Library
Howard County Library
Idabel Public Library
Malvern/Hot Spring County Library
Max Milam Library - Perryville
Montgomery County Library
Polk County Library
Saline County Public Library
Scott County Library
Sebastian County Public Library
Talihina Public Library
Yell County Library

Distribution List – Governments, Agencies, and Other Organizations

Organizations

Arkansas Chapter of the Wildlife Society
Arkansas Nature Conservancy
Arkansas Wilderness Steering Commission
Arkansas Wildlife Federation
Equestrian Unlimited
Forest Conservation Council
Forest In Holders Guardian Habitat
Heartwood
Hot Springs Bicycle Association
League Of Women Voters
Mena Nature Club
National Wild Turkey Federation
Oklahoma Wildlife Federation
Ouachita Watch League
Ozark Society
Quail Unlimited
Sierra Club
The Nature Conservancy
Wildlife Management Institute
Yell County Wildlife Federation

Business/Industry

Allstate Timber Products, Inc.
Arkansas Forestry Association
Clarksville Wood Products, Inc.
Crouch & Associates
Davis Petroleum Services
Family Garden Nursery
Georgia Pacific Corp.
Green Bay Packaging, Inc.
Miller-Patterson
Mills Oil Company
Moore Forest Products, Inc.
Sullivan Lumber Company
Weyerhaeuser
Willhite Forest Products, Inc.

Distribution List – Governments, Agencies, and Other Organizations

Education

Arkansas State University
Arkansas Tech University
Carl Albert State College
Garland County Community College
Henderson State University
Oklahoma State University
Ouachita Baptist University
Southern Arkansas University
University of Arkansas
University of Arkansas, Little Rock
University of Arkansas, Monticello
University of Oklahoma

Media

Arkansas Democrat Gazette
Arkansas Times Magazine
Associated Press - AR
Associated Press - OK
Booneville Democrat
Broken Bow Banner
Broken Bow News
Daily Oklahoman
Glenwood Herald
Heavener Ledger
Hot Springs Sentinel Record
Hugo Daily News-OK
Journal Record
LaVilla News
McCurtain County Gazette
Mena Star
Montgomery County News
Poteau News/Sun
Southeast Times
Southwest Times Record
SW Times Record-OK
Talihina American
Texarkana Gazette
Tulsa Tribune
Tulsa World
Valliant Leader
Village Voice
Waldron News
Yell County Record

Glossary of Commonly Used Terms

A

accessibility: The relative ease or difficulty of getting from or to someplace, especially the ability of a site, facility, or opportunity to be used by persons of varying physical and mental abilities.

activity: A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives.

adit: A horizontal or nearly horizontal passage driven (excavated) from the surface to access the ore body for mining purposes. Sometime referred to as a tunnel; however, a tunnel is technically different in that it is open to the surface at both ends.

affected environment: The relationship of the physical environment to the changes that will or may take place as a result of human activity.

age-class distribution: An age-class is a distinct aggregation of trees originating from a single natural event or regeneration activity, or a grouping of trees, e.g., a 10-year age class, as used in inventory or management. An age-class distribution is the location and/ or proportionate representation of different age classes in a forest.

air pollution: The presence of substances in the atmosphere, particularly those that do not occur naturally. The substances are generally contaminants that substantially alter or degrade the quality of the atmosphere. The term is often used to identify undesirable substances produced by human activity, that is, anthropogenic air pollution. Air pollution usually designates the collection of substances that adversely affect human health, animal, and plants; deteriorates structures; interferes with commerce; or interferes with the enjoyment of life.

air quality (PSD) class: Three broad classifications established by the Clean Air Act to help prevent significant deterioration of air quality for all areas of the country that are known (or assumed) to be attaining National Ambient Air Quality Standards.

Class I: Geographic area designated for the most stringent degree of air quality protection from future degradation of air quality. These congressionally-designated areas include wilderness areas over 5000 acres in size that were established as of August 7, 1977. wilderness areas and national parks where identified air quality related values might become (or currently are) adversely affected by even a small increment of additional air pollution. To date, there are 156 such areas, nation-wide.

Class II: Geographic area designated for a moderate degree of protection from future air quality degradation. Any area that is not a Class I area is considered Class II.

Class III: Geographic areas designated for the least protection from future air quality degradation. No Class III areas have been designated to date.

allocation: The assignment of management prescriptions or combination of management practices to a particular land area to achieve the goals and objectives of the alternative.

allowable sale quantity (ASQ): The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan for a time period specified by the Forest Plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."

alternative: In forest planning, a mix of policies, plans, or projects proposed for decisionmaking designed in response to public issues or management concerns.

analysis area: A collection of lands, not necessary contiguous, sufficiently similar in character, that they may be analyzed at the forest plan level.

aquatic habitat types: The classification of instream habitat based on location within channel, patterns of water flow, and nature of flow controlling structures. Habitat is classified into a number of types according to location within the channel, patterns of water flow, and nature of flow controlling structure. Riffles are divided into three habitat types: low gradient riffles, rapids, and cascades. Pools are divided into seven types: secondary channel pools, backward pools, trench pools, plunge pools, lateral scour pools, dammed pools, and beaver ponds. Glides, the third habitat type, are intermediate in many characteristics between riffles and pools. It is recognized that as aquatic habitat types occur in various parts of the country, additional habitat types may have to be described. If necessary, the regional fishery biologist will describe and define the additional habitat types.

arterial roads: Roads that provide service to large land areas and usually connect with public highways or other forest arterial roads to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource management service. They are usually developed and operated for long-term land and resource management purposes and constant service. These roads generally serve areas more than 40,000 acres.

authorized use: Specific activity or occupancy, including a ski area, historical marker, or oil and gas lease, for which a special authorization is issued.

B

basal area (BA): the area, in square feet, of the cross section of a single tree measured at 4.5 feet above ground, usually expressed as square feet per acre.

best management practice (BMP): A practice, or a combination of practices determined to be the most effective and practical means of preventing or reducing the amount of pollution generated by non-point sources to a level compatible with water quality goals.

biodiversity: The variety of life, including the variety of gene pools, species, plant and animal communities, ecosystems, and the processes through which individual organisms interact with one another, and their environments.

biological control: The use of natural means, or agents, to control unwanted pests. Examples include introduced or naturally occurring insects, bacteria, or fungi that act as predators, parasites, or disease agents of pests. Biological controls can sometimes be alternatives to mechanical or chemical means.

C

C-factor: As expressed in the Region 8 Modified Universal Soil Loss Equation, C-Factor is the forest management factor in the equation to describe the ratio of soil loss from a site with specified forest management actions causing reduced plant cover to that of the undisturbed forest condition.

canopy cover: The percent of a fixed area covered by the crown of an individual plant species or delimited by the vertical projection of its outermost perimeter. Small openings in the crown are included. Used to express the relative importance of individual species within a vegetation community, or to express the canopy cover of woody species. Canopy cover may be used as a measure of land cover change or trend. Often used for wildlife habitat evaluations.

canopy: The cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth.

capability: The potential of a land area to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and a given level of management intensity. Note: capability depends upon the current condition and site conditions including climate, slope, land form, soil and geology, and the application of management practices and protection from fire, insects, and disease.

class I areas: See air quality class.

clearcutting: The harvesting in one cut of all trees on an area for the purpose of creating a new stand. The area harvested may be a patch, stand, or strip large enough to be mapped or recorded.

collector road: Roads that serve smaller land areas and are usually connected to a forest arterial or public highway. They collect traffic from forest local roads or terminal facilities. The location and standard are influenced by long-term multi-resource service needs, and travel efficiency. Forest collector roads may be operated for constant or intermittent service, depending on land-use and resource management objectives for the area served by the facility. These roads generally have two or more local roads feeding into them and generally serve an area exceeding 10,000 acres.

commercial thinning: Any type of thinning producing merchantable material at least equal to the value of the direct cost of harvesting.

commodity outputs: A resource output with commercial value. All resource products that are articles of commerce.

commodity: Tangible or physical output, such as timber, livestock, minerals, water, etc.

common variety minerals: Common Variety Mineral Materials (CVMM) - Authority for the disposal of mineral materials is provided by the Materials Act of July 31, 1947 (30 U.S.C. 601 et seq.), as amended. Common variety mineral materials include sand, gravel and building stone. On the Ouachita National Forest in Arkansas, per Section 323 of P.L. 100-446 (10=9/27/1988) it also includes deposits of quartz mineral. This includes quartz crystal used for esthetic purposes, high quality chemically pure quartz used for high-tech industrial purposes, novaculite, tripoli and other forms of quartz mineral. Common variety mineral materials are also referred to as "Salable" minerals and are available for sale by the Forest Service under contracts and permits issued by District Rangers.

concern level: A particular degree or measure of viewer interest in the scenic qualities of the landscape as viewed from travelways and use areas, rated level 1 (highest concern) to 3 (lowest concern).

construction: The displacement of vegetation, soil and rock, and the installation of man-made structures involved in the process of building a facility.

Continuous Inventory of Stand Conditions (CISC): the USDA Forest Service, Southern Region's forest stand database containing descriptive and prescriptive data about mapped stands of forest land.

conversion (forest management): A change from one forest type to another in a stand on land that has the capability of both forest types.

coppice: A method of regenerating a stand in which all trees in the previous stand are harvested and the majority of regeneration is from stump sprouts or root suckers.

critical habitat: Habitat as defined by the U.S. Fish and Wildlife Service to be essential to meet the needs of an endangered species.

cultural resources: Physical remains of districts, sites, structures, buildings, networks or objects that were used by humans. They may be historic, prehistoric, archaeological, architectural or spiritual in nature. Cultural resources are non-renewable.

D

decommission: To stabilize or restore a road to a more natural state without any further maintenance. The entrance is obscured and the wheel tracks or pathway is no longer continuous and suitable for travel. The travel way has been removed from the transportation system. The road prism is not necessarily returned back to its original contours.

defined stream channel: A channel which exhibits evidence of annual scour.

demand: The amount of an output that users are willing to take at specified price, time period and condition of sale.

den trees: Living or dead trees with cavities used by wildlife.

desired condition: An expression of resource goals that have been set for a unit of land. Written as a narrative description of the landscape as it appears when goals have been achieved.

developed recreation area: Relatively small, distinctly defined area where facilities are provided for concentrated public use. Examples include campgrounds, picnic areas, and swimming areas.

developed recreation: Recreation that requires facilities that in turn result in concentrated use of an area. Examples of recreation areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, and buildings.

diameter at breast height (dbh): the standard method for measuring tree diameter at 4.5 feet from the ground.

dispersed recreation: A general term referring to recreation use outside a developed recreation site, this includes activities such as scenic driving, rock climbing, boating, hunting, fishing, backpacking, and recreation in primitive environments.

disturbance (ecology): Any relative discrete event in time that disrupts the ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment.

diversity: The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

dominant: Trees with crowns extending above the general level of the main canopy of even-aged groups of trees. They receive full light from above, and partly from the sides.

E

early successional: Vegetative condition typically characterized by low density to no canopy cover and an abundance of herbaceous ground cover. May include forest 0 to 10 years of age, maintained openings, pastures, balds, or open woodlands.

ecosystem management: An ecological approach to natural resource management to assure productive, healthy ecosystem by blending social, economic, physical and biological needs and values.

ecosystem: A complete interacting system of organisms and their environment.

effects: Results expected to be achieved, or actually achieved, relative to physical, biological and social (cultural and economic) factors resulting from the achievement of outputs. Examples of effects are tons of sediment, pounds of forage, person-years of employment, income, etc. There are direct effects, indirect effects and cumulative effects.

endangered species: Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act.

endemic: Species restricted to a particular geographic area. Usually limited to one or a few small streams or a single drainage.

environment: All the conditions, circumstances, and influences surrounding and affecting the development of an organism, or group of organisms.

environmental analysis: An analysis of alternative actions and their predictable short and long-term environmental effects, which include physical, biological, economic, social and environmental design factors and their interaction. (36 CFR 219.3)

environmental impact statement: A disclosure document revealing the environmental effects of a proposed action, which is required for major federal actions under Section 102 of the National Environmental Policy Act, and released to the public and other agencies for comment and review. Final Environmental Impact Statement (FEIS) is the final version of the statement disclosing environmental effects required for major federal actions under Section 102 of the National Environmental Policy Act.

environmental impact: Used interchangeably with environmental consequence or environmental effect.

epidemic: Applied to a population of pests that build up, often rapidly, to highly abnormal and generally injurious levels.

erosion: The wearing away of the land surface by the action of wind, water, or gravity.

essential habitat: Habitat in which threatened and endangered species occur, but which has not been declared as critical habitat. Occupied habitat or suitable unoccupied habitat necessary for the protection and recovery of a federally designated threatened or endangered species.

evapotranspiration: The transfer of water vapor to the atmosphere from soil and water surfaces (evaporation), and from living plant cells (transpiration).

even-aged management: The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of stands of varying ages (and, therefore, tree sizes) throughout the forest area. The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and harvested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands. (36 CFR 211.3)

even-aged: A forest (stand) composed of trees having no, or relatively small, differences in age.

existing road: All existing roads, owned or administered by various agencies, which are wholly or partly within or adjacent to and serving the National Forests and other areas administered by the Forest Service, or intermingled private lands (ref: FSM 7705.21). These roads may or may not be included on the current Forest transportation inventory, but are evident on the ground as meeting the definition of a road.

existing wilderness: Those areas already designated as wilderness by Congress.

facility: A single or contiguous group of improvements that exists to shelter or support Forest Service Programs. The term may be used in either a broad or narrow context; for example, a facility may be a ranger station compound, lookout tower, leased office, work center, separate housing area, visitor center, research laboratory, recreation complex, utility system, or telecommunications site.

federally listed: Any plant or animal species listed as threatened or endangered under the Endangered Species Act.

felling: The cutting down of trees.

Final Environmental Impact Statement (FEIS): The statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act

fire condition class: Based on coarse scale national data, classes measure general wildfire risk:

Class One: Fire regimes are usually within historical ranges. Vegetation composition and structure are intact. The risk of losing key ecosystem components from the occurrence of fire is relatively low.

Class Two: Fire regimes on these lands have been moderately altered from their historical range by increased or decreased fire frequency. A moderate risk of losing key ecosystem components has been identified.

Class Three: Fire regimes on these lands have been significantly altered from their historical return interval. The risk of losing key ecosystem components from fire is high. Fire frequencies have departed from historical ranges by multiple return intervals. Vegetation composition, structure, and diversity have been significantly altered.

fire regime: A generalized description of the role a fire plays in the ecosystem. It is characterized by fire frequency, predictability, seasonality, intensity, duration, scale (patch size), and regularity or variability. Five combinations of fire frequency exist.

fire use: The combination of wildland fire use and prescribed fire application to meet resource objectives.

floodplains: The lowland and relatively flat area adjoining inland waters, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year, and soil inundated by the 100-year flood.

forage: All browse and non-woody plants that are available to livestock or game animals used for grazing or harvested for feeding.

foreground: The area between the viewer and the middle ground in a landscape; generally from 0 to 1/2 mile distance.

Forest and Rangeland Renewable Resources Planning Act of 1974: An act of Congress requiring the preparation of a program for the management of the national forests' renewable resources, and of land and resource management plans for units of the National Forest System. It also requires a continuing inventory of all National Forest System lands and renewable resources.

forest health: The perceived condition of a forest derived from concerns about factors as its age, structure, composition, function, vigor, presence of unusual levels of insects or disease, and resilience to disturbance.

forest land: Land at least 10 percent occupied by forest trees of any size, or formerly having had such tree cover, and not currently developed for non-forest use. Lands developed for non-forest use including areas for crops, improved pasture, residential, or administrative areas, improved roads of any width, adjoining road clearing, and power line clearing of any width.

Forest Service Handbook (FSH): A handbook that provides detailed instructions for proceeding with specialized phases of programs or activities for Forest Service use.

Forest Service Manual (FSM): Agency manuals that provide direction for Forest Service activities.

Forest Supervisor: The official responsible for administering the National Forest System lands in a Forest Service administrative unit. This may consist of two or more national forests or all the forests within a state. The Supervisor reports to the regional forester.

forest type: A descriptive term used to group stands of similar composition and development because of given ecological factors, by which they may be differentiated from other groups of stands.

forest: an area of trees with overlapping crowns.

forest-wide standard: A performance criterion indicating acceptable norms, specification, or quality that actions must meet to maintain the minimum considerations for a particular resource. This type of standard applies to all areas of the forest regardless of the other management prescriptions applied.

fuel break: Any natural or constructed barrier used to segregate, stop, and control the spread of fire, or to provide a control line from which to work.

fuel loading: The amount of fuel (flammable natural materials) expressed quantitatively in terms of weight of fuel per unit area.

fuel treatment: The rearrangement or disposal of fuels to reduce fire hazard. Fuels are defined as living and dead vegetative materials consumable by fire.

fuels management: The planned treatment of fuels to achieve or maintain desired fuels conditions.

fuels: Any materials that will carry and sustain a forest fire, primarily natural materials, both live and dead.

game species: Any species of wildlife or fish for which seasons and bag limits have been prescribed, and which are normally harvested by hunters, trappers, and fishermen under state or federal laws, codes, and regulations.

goal: A concise statement that describes a desired condition to be achieved. It is expressed in broad, general terms and is timeless in that it has no specific date by which it is to be completed. Goal statements form the principal basis from which objectives are developed. (36 CFR 219.3)

goods and services: The various outputs, including on-site uses, produced from forest and rangeland resources. (36 CFR 219.3)

grassland: Areas on which vegetation is dominated by grasses, grass-like plants, forbs, and/or cryptogams (mosses, lichens, and ferns), provided these areas do not qualify as built-up land or cultivated cropland. Examples include tall grass and short grass prairies, meadows, cordgrass marshes, sphagnum moss areas, pasturelands, and areas cut for hay.

grazing: Consumption of range or pasture forage by animals.

ground water: Subsurface water in a saturated zone or geologic stratum.

group selection: An uneven-aged regeneration method in which trees are removed periodically in small groups. Uneven age classes for trees are established in small groups. The width of groups is about twice the height of the mature trees, with small opening providing microenvironments suitable for tolerant regeneration, and the larger openings providing conditions suitable for more intolerant regeneration.

growing season: The months of the year a species of vegetation grows, from leaf emergence to leaf fall.

habitat: The native environment of an animal or plant in which all the essentials for its development, existence, and reproduction are present.

harvest method: A procedure by which a stand is logged. Emphasis is on meeting logging requirements rather than silvicultural objectives.

herbicide: A pesticide used for killing or controlling the growth of undesirable plants.

hydric soils: Soils developed in conditions where soil oxygen is limited by the presence of saturated soil for long periods during the growing season.

infestation: The attack by macroscopic organisms in considerable concentration. Examples are infestations of tree crowns by gypsy moth, timber by termites, soil or other substrates by nematodes or weeds.

instream flow: The volume of surface water in a stream system passing a given point at a given time.

integrated pest management (IPM): The maintenance of destructive agents, including insects at tolerable levels, by the planned use of a variety of preventive, suppressive, or regulatory tactics and strategies that are ecologically and economically efficient and socially acceptable.

intermediate stand treatments: A collective term for any treatment designed to enhance growth, quality, vigor, and composition of the stand after establishment of regeneration and prior to final harvest. Types include thinning, release and improvement cuttings.

intermittent service road: A road developed and operated for periodic service and closed for more than one year between periods of use.

intermittent streams: Streams that flow in response to a seasonally-fluctuating water table in a well-defined channel. The channel will exhibit signs of annual scour, sediment transport, and other stream channel characteristics, absent perennial flows. Intermittent streams typically flow during times of elevated water table levels, and may be dry during significant periods of the year, depending on precipitation cycles.

interpretive services: Visitor information services designed to present inspirational, educational, and recreational values to forest visitors in an effort to promote understanding, appreciation, and enjoyment of their forest experience.

invasive species: A species that can move into an area and become dominant either numerically or in terms of cover, resource use, or other ecological impacts. An invasive species may be native or non-native.

L

land acquisition: Obtaining full landownership rights by donation, purchase, exchange, or condemnation.

land exchange: The conveyance of non-federal land or interests in the land in exchange for National Forest System land or interests in land.

landing: A cleared area in the forest to which logs are yarded or skidded for loading onto trucks for transport.

land line location: Legal identification and accurate location of national forest property boundaries.

landscape character: Particular attributes, qualities, and traits of a landscape that give it an image and make it more identifiable or unique. Levels include Natural Evolving, Natural Appearing, Pastoral/Agricultural, Historic, Transitional, Suburban, and Urban.

landscape: An area composed of interacting ecosystems that are repeated because of geology, land form, soils, climate, biota, and human influences throughout the area. Landscapes are generally of a size, shape, and pattern that are determined by interacting ecosystems.

leasable minerals: See minerals (leasable).

lease: A contract between the landowner and another granting the latter the right to search for and produce oil, gas, or other mineral substances (as specified in the document) on payment of an agreed rental, bonus, or royalty. This right is subject to the terms, conditions, and limitations specified in the document.

leave tree: A tree (marked to be) left standing for wildlife, seed production, etc., in an area where it might otherwise be felled.

logging: The cutting and removal of trees from a forest.

M

management action: A set of management activities applied to a land area to produce a desired output.

management area: An area with similar management objectives and a common management prescription.

management direction: A statement of multiple-use goals, objectives, and standards for attaining them. Management direction is expressed forest-wide, by management prescription, and by management area.

management emphasis: The multiple-use values to be featured or enhanced within a given management prescription or management area.

management indicator species (MIS): An animal or plant selected for use as a planning tool in accordance with 1982 NFMA regulations (36 CFR 219.19). These species are used to help set objectives, analyze effects of alternatives, and monitor Forest Plan implementation. They are chosen because their population changes are believed to indicate the effects of management on selected biological components.

management practice: A specific action, measure, course of action, or treatment undertaken on a forest.

management prescription: Management practices and intensity selected and scheduled for application on a specific area to attain multiple use and other goals and objectives. (36 CFR 219.3)

management type: The tree species or species group that should be grown on a specific site, whether or not it presently occupies the site that best suits the particular site soil, aspect, elevation, and moisture provided by the area and the forest plan's objectives.

mast: The fruit of trees such as oak, beech, sweet chestnut and also the seeds of certain pines; for example, shortleaf and loblolly pines, particularly where considered as food for livestock and certain kinds of wildlife.

mesic: Sites or habitats characterized by intermediate moisture conditions, i.e., neither decidedly wet or dry.

mineral entry: All National Forest System lands which (1) were formerly public domain lands subject to location and entry under the U.S. mining laws, (2) have not been appropriated, withdrawn, or segregated from location and entry, and (3) have been or may be shown to be mineral lands, are open to prospecting for locatable, or hardrock, minerals.

mineral exploration: The search for valuable minerals on lands open to mineral entry.

mineral materials: Materials such as road aggregate, landscaping rock, rip-rap, and other earthen construction materials. These materials are used to build and maintain trails, roads, and campgrounds; to restore riparian and aquatic habitat; to repair flood damage, etc.

mineral resource: A known or undiscovered concentration of naturally occurring solid, liquid, or gaseous material in or on the earth's crust in such form and amount that economic extraction of a commodity is currently or potentially feasible.

mineral soil: Weathered rock materials without any vegetative cover.

minerals, leasable: Coal, oil, gas, phosphate, sodium, potassium, oil shale and geothermal steam on public domain and acquired status lands, and hard rock minerals on acquired lands.

minerals, locatable: Hard rock minerals on public domain status land. May include certain nonmetallic minerals and uncommon varieties of mineral materials.

minimum level: The minimum level of management which complies with applicable laws and regulations, including prevention of significant or permanent impairment of the long-term productivity of the land, and which would be needed to maintain the land as a National Forest, and to manage uncontrollable outputs, together with associated costs and inputs.

mining claims: That portion of the public estate held for mining purposes in which the right of exclusive possession of locatable mineral deposits is vested to the locator of a deposit.

mitigation: Actions to avoid, minimize, reduce, eliminate, or rectify the impact of a management practice.

modified seed tree: A timber harvest cut designed to obtain natural regeneration from seed trees left for that purpose. Approximately 10-20 sq. ft. of pine and hardwood basal area per acre are retained in the overstory. Seed trees are retained indefinitely. This cut will establish a two-aged stand. This treatment differs from a traditional seedtree by retaining a mix of hardwoods and pines in the overstory after regeneration.

modified shelterwood: A timber harvest cut designed to establish natural regeneration and develop a two-aged stand. Approximately 20-40 sq. ft. of pine and hardwood basal area per acre are retained in the overstory. After seedlings are established, the overstory may be thinned again, to a density that will provide for the development of regeneration. The remaining large trees are retained indefinitely. This treatment differs from a traditional shelterwood by retaining a mix of hardwoods and pines in the overstory after regeneration.

monitoring and evaluation: The evaluation on a sample basis of Forest Plan management practices to determine how well objectives have been met, as well as the effects of those management practices on the land and environment.

monitoring: The periodic evaluation on a sample basis of Forest Plan management practices to determine how fully objectives have been met, how closely management standards have been applied, and what effects those practices had on the land and environment.

motorized equipment: Machines that use a motor, engine, or other non-living power source. This includes, but is not limited to such machines as chain saws, aircraft, generators, motor boats, and motor vehicles. It does not include small battery or gas powered hand carried devices such as shavers, wristwatches, flashlights, cameras, stoves, or other similar small equipment.

multiple use: Management of all the various resources of the National Forest system so that they are utilized in the combination that will best meet needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some lands will be used for less than all of the resources and services; and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of the uses that will give the greatest dollar return or the greatest unit output. (36 CFR 219.3)

N

National Environmental Policy Act (NEPA): An Act, to declare a National policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation; and to establish a Council on Environmental Quality.

National Forest Land and Resource Management Plan (Forest Plan): A plan developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974, as amended, that guides all natural resource management activities and establishes management standards and guidelines for the National Forest System lands of a given national forest.

national forest land: Ouachita National Forest System lands for which the Forest Service is assigned administrative responsibility.

National Forest Management Act (NFMA): A law passed in 1976 amending the Forest and Rangeland Renewable Resources Planning Act that requires the preparation of Regional and Forest Plans, and regulations to guide that development.

national forest system (NFS): All National Forest System lands reserved or withdrawn from public domain of the United States and acquired through purchase, exchange, donation, or other means. National Grasslands and land utilization projects administered under Title III of the Bankhead-Jones Farm Tenant Act (50 Stat. 525, 7 U.S.C. 1010-1012), and other lands, waters, or interests that are administered by the Forest Service, or are designated for administration through the Forest Service as a part of the system.

national forest system land: Federal land that has been legally designated as national forests or purchase units, and other land under the administration of the Forest Service, including experimental areas and Bankhead-Jones Title III land.

National Recreation Trails: Trails designated by the Secretary of the Interior or the Secretary of Agriculture as part of the national system of trails authorized by the National Trails System Act. National recreation trails provide a variety of outdoor recreation uses, in or reasonably accessible, to urban areas.

National Register of Historic Places: The National Register of Historic Places is the Nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archaeological resources. Properties listed in the National Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the US Department of the Interior.

National Visitor Use Monitoring (NVUM): A systematic process to estimate annual recreation and other uses of National Forest System lands through user surveys.

National Wild and Scenic Rivers System: Rivers with scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values designated by Congress under the Wild and Scenic Rivers Act of Oct. 2, 1968, for preservation of their free-flowing condition.

National Wilderness Preservation System: All lands covered by the Wilderness Act and subsequent wilderness designations, irrespective of the department or agency having jurisdiction.

natural plant community: an association of plant species which are endemic to an area and whose characteristics have not been adversely affected by human disturbance.

natural regeneration: Renewal by self-sown seed or by vegetative means (regrowth).

net annual growth: The net change in merchantable volume expressed as an annual average between surveys in the absence of cutting (gross growth minus mortality).

net public benefits: An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued. Net public benefits are measured by quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield.

no surface occupancy (NSO): Use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect the identified resource values.

no-action alternative: The condition expected to exist in the future if current management direction would continue unchanged.

non-attainment area: For National Ambient Air Quality Standards (NAAQS), where the pattern of "violations of standard" is sufficient to require remedial action; a boundary is determined around the location of the violations. The area within that boundary is designated to be in non-attainment of the particular NAAQS and an enforceable plan is developed to prevent additional violations.

non-commercial thinning: The thinning of commercial-size trees without a subsequent sale of associated wood products. Also called a pre-commercial thinning.

non-motorized recreation: A recreational opportunity provided without the use of any motorized vehicle. Participation in these activities is accomplished through the use of foot, or horseback travel. Motorized vehicle equipment may be authorized for administrative purposes of resource management.

non-point source pollution: A diffuse source of pollution not regulated as a point source. May include atmospheric, deposition, agricultural runoff, and sediment from land-distributing activities.

0

objective: A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals. (36 CFR 219.3)

obligate species: a plant or animal species which occurs naturally only in a specific type of habitat.

obliteration: The reclamation of the land occupied by a facility for purposes other than transportation.

occupancy trespass: The illegal occupation or possession of National Forest land or property.

off-highway vehicle (OHV): Any vehicles capable of being operated off established roads.

old growth forests: an ecosystem distinguished by old trees and related structural attributes. Old growth encompasses the later stages in a variety of characteristics including tree size, accumulation of large dead woody material, number of canopy layers, species composition, and ecosystem function. Old growth is not necessarily virgin or primeval. It can develop over time following human disturbances, just as it does following natural disturbances. Old growth encompasses both older forests dominated by early seral species and forests in later successional stages dominated by shade tolerant species.

old growth: A stand of trees that is usually well past the age of maturity as defined by the culmination of mean annual increment and often exhibit characteristics of decadence. These characteristics may include, but are not limited to: low growth rates, dead and dying trees, snags, and down woody material.

open road density: Calculated by converting the acres within the allocation of a contiguous block into square miles (total acres/640 acres) and then dividing that figure into the linear measure of open roads within the block. Open roads forming the boundary of a contiguous management prescription block contribute half of their length to open road density calculations. An open road is a motorized travelway (including designated motorized trails) used on a regular basis.

operating plan: A written plan, prepared by those engaged in mining activity on the forests, and approved by a forest officer for prospecting, exploration, or extraction activities that are slated to take place on National Forest System land.

outstanding mineral rights: Instances in which the minerals in federally: owned lands were severed prior to the transaction in which government acquired the land. Such rights are not subject to the Secretary of Agriculture's rules and regulations. Removal or extraction of these minerals must be allowed in accordance with the instrument severing the minerals from the surface and under applicable state and local laws and regulations. See also Reserved Mineral Right.

overstory: That portion of trees in a two: or multi-layered forest stand that provides the upper crown cover.

P

partnership: Voluntary, mutually beneficial and desired arrangement between the Forest Service and another or others to accomplish mutually agreed-on objectives consistent with the agency's mission and serving the public's interest.

payments in lieu of taxes: Payments to local or state governments based on ownership of federal land, and not directly dependent on production of outputs or receipt sharing.

perennial stream: A stream with a defined channel that flows at least 90 percent of the time. Includes channels that contain permanent pools of water that may be connected by areas without surface flow but which generally have subsurface flow.

personal use: The use of a forest product, such as firewood, for home use as opposed to commercial use or sale.

persons-at one-time (PAOT): A recreation capacity measurement term indicating the number of people that can use a facility or area at one time.

planning period: One decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits.

policy: A guiding principle upon which is based a specific decision or set of decisions.

possible old growth: areas with the highest probability of being existing or future old growth based on the preliminary inventory criteria.

precommercial thinning: The selective felling or removal of trees in a young stand primarily to accelerate diameter increment on the remaining stems, maintain a specific stocking or stand density range, and improve the vigor and quality of the trees that remain.

preferred alternative: After evaluation completed in the planning process, the alternative chosen by the Agency (Regional Forester) as the alternative that would most nearly meet Agency objectives

prescribed fire (burning): Controlled application of fire to wildland fuels in either their natural or modified state, under such conditions of weather, fuel moisture, soil moisture, etc. as allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives of silviculture, wildlife management, grazing, fire hazard reduction, etc. **NOTE:** It seeks to employ fire scientifically to realize maximum net benefits with minimum damage and at acceptable cost.

prescribed fire: Any fire ignited by management actions to meet specific objectives including disposal of fuels, and controlling unwanted vegetation. The fires are conducted in accordance with prescribed fire plans, and are also designed to stimulate grasses, forbs, shrubs, or trees for range, wildlife, recreation, or timber management purposes.

prescription: See Management Prescription, and Silvicultural Prescription.

present net value (present net worth): The difference between net benefits and net costs, each discounted to the present.

proclamation boundary: The boundary contained within the presidential proclamation that established the national forest.

program: Sets of activities or projects with specific objectives, defined in terms of specific results and responsibilities for accomplishments.

project: A work schedule prescribed for a project area to accomplish management prescriptions. An organized effort to achieve an objective identified by location, activities, outputs, effects, time period, and responsibilities for execution.

proposed action: In terms of the National Environmental Policy Act, the project, activity, or decision that a federal agency intends to implement or undertake. The proposed action described in the Environmental Impact Statement is the Forest Plan.

proposed wilderness study area: Areas recommended for wilderness study by the Forest Service but which have yet to be acted on by Congress.

public access: Usually refers to a road or trail route over which a public agency claims a right-of-way for public use.

public net benefit: The change in the well being of a people as a whole after allowances for costs of factors of production and other goods and services incidental to the management decision.

public: The people of an area, state or nation that can be grouped together by a commonality of interests, values, beliefs or lifestyles.

R

range allotment: A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan.

range management: The art and science of planning and directing range use to obtain sustained maximum animal production, consistent with perpetuation of the natural resources.

Ranger District: Administrative subdivision of the Forest, supervised by a District Ranger who reports to the Forest Supervisor.

reconstruction: Work that includes, but is not limited to, widening of roads, improving alignment, providing additional turnouts, and improving sight distance that improve the standard to which the road was originally constructed. Also undertaken to increase the capacity of the road or to provide greater traffic safety.

record of decision: A document separate from, but associated with an environmental impact statement that publicly and officially discloses the responsible official's decision on the alternative assessed in the environmental impact statement chosen to implement.

Recreation Opportunity Spectrum (ROS): A method for classifying types of recreation experiences available, or for specifying recreation experience objectives desired in certain areas. Classes include:

Primitive (P): An area characterized by having essentially unmodified natural environment of 5,000 or more acres. Interaction between users is very low; evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted. There is a high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of outdoor skills in an environment that offers a high degree of challenge and risk.

Semi-Primitive Non-Motorized (SPNM): Area characterized by a predominantly natural or natural-appearing environment of 2,500 or more acres. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is not permitted. There is a moderately high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk.

Semi-Primitive Motorized (SPM): Area characterized by a predominantly natural or natural-appearing environment of 2,500 or more acres, with a moderately high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk. Motorized use is permitted.

Roaded Natural (RN): Area characterized by a predominantly natural or natural-appearing environment with a low probability of experiencing isolation from the sights and sounds of man. Interaction between users may be low to moderate, but with evidence of other users prevalent. Conventional motorized use is provided for in construction standards and design of facilities. Opportunities for both motorized and non-motorized forms of recreation may be provided.

Rural (R): Area characterized by a substantially modified natural environment with a low probability of experiencing isolation from the sights and sounds of man. A considerable number of facilities are designed for use by a large number of people. Facilities for intensified motorized use and parking are provided.

Urban (U): Area characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Vegetative cover is often manicured. Sights and sounds of humans, on-site, are predominant. Facilities for highly intensified motorized use and parking are available with forms of mass transit often available to carry people throughout the site.

recreation: Any socially desirable leisure activity in which an individual participates voluntarily and from which he derives satisfaction.

recreational opportunity: Availability of settings for users to choose from (activities) that provide refreshment of the body or mind.

reference condition: Reference conditions are the characteristic mosaic of vegetation such as composition and structure and the frequency and severity of disturbances under the historic range of variability. Reference conditions are used to calculate Fire Regime Condition Class (FRCC) and can be used as a baseline measurement.

reforestation: The natural or artificial restocking of an area with forest trees.

regeneration cutting: Any removal of trees intended to assist regeneration already present or to make regeneration possible.

regeneration: The re-establishment of forest cover by seeding, planting, and natural means (also called reforestation). Also used as a noun referring to the young trees themselves.

region: An administrative unit within the National Forest system. The United States is divided into nine geographic regions. Each region has a headquarters office and is supervised by a Regional Forester. Within each region are located National Forests and other lands of the Forest Service.

Regional Forester: The official responsible for management of National Forest land within a USDA Forest Service region.

research natural area: An area set aside by the Forest Service specifically to preserve a representative sample of an ecological community, primarily for scientific and educational purposes. Commercial exploitation is not allowed and general public use is discouraged.

reserved mineral rights: Refers to those cases wherein the minerals were severed from the surface during the transaction whereby the government acquired the land. These rights are subject to the Secretary of Agriculture's rules and regulations that were applicable at the time of the transaction.

resource: An aspect of human environment which renders possible, or facilitates the satisfaction of, human wants, and the attainment of social objectives.

restoration: The process of modifying an ecosystem or repairing damage, such that natural processes will again function in the repaired system to achieve a desired, healthy and functioning condition.

retention: A visual quality objective in which human activities are not evident to the casual forest visitor.

revegetation: The re-establishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of humans (e.g., afforestation and range reseeding).

revision: To make the plan new or up-to-date. Plan revision must be considered and approved in accordance with the requirements for the development and approval of a forest plan. Revisions take place every 10-15 years, but may occur more frequently if conditions or public demands change significantly.

right-of-way: A right of use across the lands of others. It generally does not apply to absolute purchase of ownership.

riparian areas: Areas with three-dimensional ecotones of interaction that include terrestrial and aquatic ecosystems that extend down into the groundwater, up above the canopy, outward across the floodplain, up the near-slopes that drain to the water, laterally into the terrestrial ecosystem, and along the watercourse at a variable width.

riparian ecosystem: A transition between the aquatic ecosystem and the adjacent terrestrial ecosystem identified by soil characteristics (alluvial soils inundated by a 100-year flood, wetland soils) and distinctive vegetative communities that require free and unbound water.

riparian: Land areas directly influenced by water. They usually have visible vegetative or physical characteristics showing this water influence. Streamside, lake borders, and marshes are typical riparian areas.

riparian dependent species: Species that are dependant on riparian areas during at least one stage of their life cycle.

ripping: A process where the soil is mechanically sliced or broken to improve tilth, aeration, and permeability.

road construction: Activity that results in the addition of forest system or temporary road miles.

Road Maintenance Levels: Levels are described as follows:

- a. Level 1: Road normally closed to vehicle traffic.
- b. Level 2: Road open for limited passage of traffic but not normally suitable for passenger cars.
- c. Level 3: Road open for public traffic including passenger cars, but may not be smooth or comfortable.
- d. Level 4: Road suitable for all types of vehicles, generally smooth to travel and dust may be controlled.
- e. Level 5: Road is smooth and dust free, and the surface is skid resistant, if paved.

road reconstruction: Activity that results in improvement or realignment of an existing system road defined as follows:

road improvement: Activity that results in an increase of an existing road's traffic service level, expansion of its capacity, or a change in its original design function.

road realignment: Activity that results in a new location of an existing road or portions of an existing road, and treatment of the old roadway.

road: A motor vehicle path more than 50 inches wide, unless classified and managed as a trail. It may be classed as a system or non-system road.

roads analysis process (RAP): Roads analysis is an integrated ecological, social, and economic science based approach to transportation planning that addresses existing and future road management options. The intended effects are to ensure that decisions to construct, reconstruct, or decommission roads will be better informed by using a roads analysis. Roads analysis may be completed at a variety of different scales, but generally begins with a broad forest-scale analysis to provide a context for future analyses.

sapling: A usually young tree that is larger than a seedling, but smaller than a pole. Size varies by region.

Scenery Management System (SMS): A system for the inventory and analysis of the aesthetic values of the National Forest System lands. It replaces the Visual Management System (VMS) as defined in Agricultural Handbook #462.

scenic attractiveness: The scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, rockform, waterform, and vegetation pattern. Classified as A (Distinctive), B (Typical or Common), or C (Undistinguished).

scenic class: A system of classification describing the importance or value of a particular landscape or portions of that landscape. Values range from 1 (highest value) to 7 (lowest value).

scenic integrity objective (SIO): A desired level of excellence based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations to the valued attributes of the characteristic landscape. Objectives include Very High, High, Moderate, and Low.

Very High (VH): Generally provides for only for ecological changes in natural landscapes and complete intactness of landscape character in cultural landscapes.

High (H): Human activities are not visually evident to the casual observer. Activities may only repeat attributes of form, line, color, and texture found in the existing landscape character.

Moderate (M): Landscapes appear slightly altered. Noticeable human-created deviations must remain visually subordinate to the landscape character being viewed.

Low (L): Landscapes appear moderately altered. Human-created deviations begin to dominate the valued landscape character being viewed but borrow from valued attributes such as size, shape, edge effect, and pattern of natural openings, vegetative type changes, or architectural styles outside the landscape being viewed.

scenic integrity: A measure of the degree to which a landscape is visually perceived to be "complete." The highest scenic integrity ratings are given to those landscapes which have little or no deviation from the character valued for its aesthetic appeal. Scenic integrity is used to describe an existing situation, standard for management, or desired condition.

sediment: Solid mineral and organic material that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice.

sedimentation: The deposition of detached soil and rock material transported by or suspended in water.

seed tree: An even-aged regeneration method where in a single cut, the removal of all merchantable trees in a stand, except for a small number of widely dispersed trees retained for seed production, and to produce a new age class in a fully-exposed microenvironment.

seep: A wet area where a seasonal high water table intersects with the ground surface. Seeps that meet the definition of a wetland are included in the Riparian Corridor.

Selected Alternative: The alternative chosen by the Regional Forester to implement as the Revised Forest Plan.

sensitive species: Those species that are placed on a list by the Regional Forester for which population viability is a concern.

seral stage: a developmental, transitory stage in the ecological succession of a biotic community.

shaft: A vertical excavation from the surface or within a mine, of limited area compared with its depth; made for finding or mining ore, lowering and hoisting miners, ventilation, and other purposes in an underground mining operation.

shelterwood: A regeneration method of regenerating an even-aged stand in which a new age class develops beneath the partially shaped microenvironment provided by the residual trees. The sequence of treatments can include three distinct types of cuttings: (1) an optional preparatory harvest to enhance conditions for seed production; (2) an establishment harvest to prepare the seed bed, and to create a new age class; and 3) a removal harvest to release established regeneration from competition with the overwood.

silvicultural system: A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop, and provide for regeneration and according to the type of forest thereby produced.

silviculture: The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands. Silviculture entails the manipulation of forest and woodland vegetation in stands and on landscapes to meet the diverse needs and values of landowners and society on a sustainable basis.

single-tree selection: A regeneration method of creating new age classes in uneven-aged stands in which individual trees of all size classes are removed uniformly throughout the stand to achieve desired stand structural characteristics.

site index: A numerical evaluation of the quality of land for plant productivity.

site preparation: The removal of competition and conditioning of the soil to enhance the survival and growth of seedlings or to enhance the germination of seed.

site: An area considered in terms of its physical and/or biological environment, e.g., riparian zone, a homogenous stand of vegetation, a campground, etc.

skid trail: A temporary pathway through the woods formed by loggers dragging (skidding) logs from the stump to a log landing or skid road, without dropping a blade and without purposefully changing the geometric configuration of the ground over which they travel.

skidding: A term for moving logs by dragging from stump to roadside, deck, or other landing.

slash: The residue left on the ground after harvesting, sanitation operations, windstorm or fire. It includes unutilized logs, uprooted stumps, broken or uprooted stems, tops, branches, leaves, etc.

snag: A dead or partially dead (more than 50 percent) hardwood or pine tree which is used by many species for perching, feeding, or nesting.

soil productivity: The capacity of a soil to produce a specific crop such as fiber, forage, etc., under defined levels of management. It is generally dependent on available soil moisture and nutrients and length of growing season.

southern pine beetle: One of the many species of pine bark beetles that are present in the forest at all times. When environmental and forest conditions become favorable, the beetle populations can increase and cause substantial timber losses over extensive areas in a relatively short period of time.

Southern Region: The Forest Service organizational unit consisting of thirteen Southeastern states and Puerto Rico.

special interest area: Areas supporting some unique biological element(s) such as novaculite glades, acid seeps, etc., that have been or will be protected.

special use authorization: A permit, term permit, or easement that allows occupancy, use, rights, or privileges of National Forest System land.

special-use permits: Special uses are permits issued by the Forest Service for various land uses.

SPECTRUM: A computer modeling tool to model alternative resource management scenarios applied to landscapes through time in support of strategic and tactical planning. This includes scheduling vegetation manipulation activities to achieve ecosystem management objectives; modeling resource effects and interactions within management scenarios; and exploring tradeoffs between alternative management scenarios in support of decision-making.

spring: A water source located where water begins to flow from the ground due to the intersection of the water table with the ground surface. Generally flows throughout the year. Springs that are the source of perennial or intermittent streams are included in the Riparian Corridor.

stand improvement: A term comprising all intermediate cuttings made to improve the composition, structure, condition, health, and growth of even-aged, two-aged, or uneven-aged stands.

stand: A contiguous group of trees sufficiently uniform in age-class distribution, composition, and structure, and growing on a site of sufficiently uniform quality, to be a distinguishable unit.

standard: A principle requiring a specific level of attainment, a rule to measure against.

stocking: The degree of occupancy of land by growing stock trees, measured by basal area or number of trees per unit area and spacing compared with a minimum standard: which varies by tree size and species or species group: to the occupancy that is required to fully utilize the growth potential of the land.

stream: A water course having a distinct natural bed and banks; a permanent source which provides water at least periodically; and at least periodic or seasonal flows at times when other recognized streams in the same area are flowing.

suitability: The appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

suitable for timber production: National Forest System land allocated by a Forest Plan decision to be managed for timber production on a regulated basis. *Regulated basis* means a systematic relationship between tree growth and timber harvest such that a specific timber volume objective level can be sustained indefinitely.

suitable: Land that is to be managed for timber production on a regulated basis.

suppression (fire suppression): Any act taken to slow, stop or extinguish a fire. Examples of suppression activities include line construction, backfiring, and application of water or chemical fire retardants.

targets: Assignments made to the Forest by the Regional Forester. A statement used to express planned results to be achieved within a stated period of time.

temporary road: A road authorized by contract, permit, lease, other written authorization, or emergency operation, not intended to be part of the forest transportation system and not necessary for long-term resource management.

ten (10)-year entry: This is the average length of time between regeneration harvests. This is considered only an average, with actual entries allowed to vary from 8 to 12 years. Entry is defined as when the timber is sold.

tentatively suitable: Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary, or the Chief; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils, productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.

terrestrial: of, or pertaining to, land as distinct from water.

thinning: A cutting made to reduce stand density of trees primarily to improve growth, enhance forest health, or to recover potential mortality.

threatened species: Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Designated as a threatened species in the Federal Register by the Secretary of Interior.

timber production: The purposeful growing, tending, harvesting, and regeneration of regulated crops of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. For purposes of forest planning, timber production does not include the production of fuelwood or harvests from unsuitable lands. (36 CFR 219.3, 1982 rule)

timber stand improvement: A term comprising all intermediate cuttings made to improve the composition, constitution, condition, and increment of a timber stand.

timber: A general term applied to tree stands that provide a wood fiber product, specifically sawed lumber five by five inches or more in width and depth.

topography: The configuration of a land surface including its relief, elevation, and the position of its natural and human-made features.

trail: A general term denoting a way for purposes of travel by foot, stock or trail vehicle. (A trail vehicle is one which is 40 inches or less in width and is designated for trail use.)

trailheads: The parking, signing, and other facilities available at the terminus of a trail.

transportation system: All roads needed to manage and administer the Forest resources. A road network.

trespass: The invasion of the property or rights of another without owner's consent.

two-aged stand: A stand composed of two distinct age classes that are separated in age by more than 20 percent of rotation.

U

understory: The trees and other vegetation growing under a more or less continuous cover of branches and foliage formed collectively by the upper portion (overstory) of adjacent trees and other woody growth.

uneven-aged management: The manipulation of a forest for a continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of age or diameter (size) classes to provide a sustained yield of forest products. Managed uneven-aged forests are characterized by trees of many ages, or sizes intermingled singly or in groups. Trees are harvested singly or in small groups with the process of regeneration of the desirable species occurring either continuously or at each harvest. Each harvest usually includes thinning and cultural treatments to promote growth and maintain or enhance stand structure. The basic method for control (regulation) is some expression of volume (such as basal area), stand structure, and maximum tree size.

uneven-aged: a stand of trees in which the individual trees originated over a long period of time and, thus, differ widely in age; a regeneration system designed to produce such a stand.

unsuitable forest land (not suited): Forest land that is not managed for timber production because (a) the land has been withdrawn by Congress, the Secretary, or the Chief; (b) the land is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soils, productivity, or watershed conditions; (d) there is no reasonable assurance that lands can be adequately restocked within 5 years after final harvest, based on existing technology and knowledge, as reflected in current research and experience; (e) there is at present, a lack of adequate information to responses to timber management activities; or (f) timber management is inconsistent with or not cost efficient in meeting the management requirements and multiple-use objectives specified in the Forest Plan.

V

viable population: Population of plants or animals that has the estimated numbers and distribution of reproductive individuals to ensure its continued existence is well distributed in the planning area.

viewshed: The total landscape seen, or potentially seen, from all or a logical part of a travel route, use area, or waterbody.

visual resource: The composite of basic terrain, geological features, water features, vegetative patterns, and land-use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

W

water bars: A change in the grade of a roadbed, trail surface, or fire line used to divert water off the surface to prevent it from eroding ruts and possibly carrying sediment to a stream.

watershed: The entire area that contributes water to a drainage system or stream.

wetlands: Those areas that are inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats and natural ponds.

wild and scenic river: A river or section of river designated as such by congressional action under the Wild and Scenic Rivers Act of Oct. 2, 1968, as supplemented and amended, or those sections of a river designated as wild, scenic, or recreational by an act of the legislature of the state or states through which it flows. A river can be classified under the following three categories:

wild river: Free of impoundments and generally inaccessible except by trail, and within watersheds or shorelines that are essentially primitive.

scenic river: Free of impoundments but accessible by roads, and within watersheds or shorelines that are still largely primitive and undeveloped.

recreational river: Readily accessible by roads, with some development along their shorelines and may have undergone some impoundment or diversion in the past.

wilderness: Area designated by congressional action under the 1964, 1975, 1980 and 1983 Wilderness Acts. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation; include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

wildland fire: Any non-structural fire on wildlands other than one intentionally set for management purposes. Confined to a predetermined area. Not to be confused with "fire use," which includes prescribed fire.

wildland-urban interface: The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

wildlife habitat improvement: The manipulation or maintenance of vegetation to yield desired results in terms of habitat suitable for designated wildlife species or groups of species.

wildlife stand improvement (WSI): Habitat improvements involving the manipulation of either the overstory or understory crown canopy which benefit wildlife, fish, or threatened and endangered animals and plants.

wildlife: All non-domesticated mammals, birds, reptiles, and amphibians living in a natural environment, including game species and non-game species. Animals, or their progeny (i.e., feral animals: including horses, burros, and hogs), that once were domesticated, but escaped captivity, are not considered wildlife.

withdrawal: An order removing specific land areas from availability for certain uses.

withdrawn: National Forest System lands segregated or otherwise withheld from settlement, sale, location, or entry under some or all of the general land laws.

woodlands: an open stand of trees with crowns not usually touching (generally forming a 25 to 60 percent cover).

xeric: Pertaining to sites or habitats characterized by decidedly dry conditions.

Glossary of Commonly Used Abbreviations and Acronyms

$\mu\text{g}/\text{m}^3$ Microgram(s) per cubic meter

A

ADA	Americans with Disabilities Act
AGFC	Arkansas Game and Fish Commission
AQI	Air Quality Index
AQRV	Air Quality Related Values
ARPA	Archaeological Resources Protection Act
ASQ	Allowable Sale Quantity
AUM	Animal Unit Month

B

BA	Basal Area
BMP	Best Management Practice

C

CAA	Clear Air Act
CCF	Hundred Cubic Feet
CFR	Code of Federal Regulations
CSU	Controlled Surface Use
CUS	Control of Undesirable Species

D

DBH	Diameter at Breast Height
DEIS	Draft Environmental Impact Statement

E

EF	Experimental Forest
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency

F

FEIS	Final Environmental Impact Statement
FIA	Forest Inventory and Analysis
FY	Fiscal Year

H

HMA Habitat Management Areas

I

IMR Implementation Monitoring Review

IPM Integrated Pest Management

M

MA Management Area

MIS Management Indicator Species

N

NAAQS National Ambient Air Quality Standards

NEPA National Environmental Policy Act

NF National Forest

NFMA National Forest Management Act

NFS National Forest System

NRA National Recreation Area

O

ODWC Oklahoma Department of Wildlife and Conservation

OHV Off-Highway Vehicle

ONF Ouachita National Forest

P

PET Proposed, Endangered, or Threatened Species

PETS Proposed, Endangered, Threatened or Sensitive Species

R

RCW Red-cockaded Woodpecker

RD Ranger District

RNA Research Natural Area

ROS Recreation Opportunity Spectrum

ROW Right-of-Way

S

SERA Syracuse Environmental Research Associates

SHPO State Historic Preservation Officer

SIO Scenic Integrity Objective

SMA	Streamside Management Area
SMS	Scenery Management System
SPB	Southern Pine Beetle
SPM	Semi-Primitive Motorized
SPNM	Semi-Primitive Non-Motorized

T

THPO	Tribal Historic Preservation Office
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U

USDA	U.S. Department of Agriculture
USDI	U.S. Department of Interior
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

W

WUI	Wildland Urban Interface
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Plant Conference Call, June 4, 2003. Ozark NF, Attendees: Mike Brod, Theo Witsell, Scott Simon, discussion on list of species for the Ozark-St. Francis NF.

Plant Meeting, August 25, 2003 in Hot Springs, AR Attendees: Susan Hooks, Mike Brod, and Jeff Holmes, entered final data into the database.

Plant Meeting, July 15, 2003. in Hot Springs, AR Attendees: Susan Hooks, Mike Brod, worked on entering species info into database.

Plant Meeting, July 18, 2003. in Hot Springs, AR Attendees: Susan Hooks, Mike Brod, worked on species document as references for the database.

Plant Meeting, July 23, 2003. in Hot Springs, AR Attendees: Susan Hooks, Theo Witsell, reviewed each species and its associated targets.

Plant Meeting, July 8, 2003. in Hot Springs, AR Attendees: Susan Hooks, Scott Simon, Betty Crump, Jeff Holmes, assigned species to targets and revised some key factors.

Plant Meeting, June 17, 2003 in Hector, AR Attendees: Susan Hooks and Mike Brod, reviewed the database and began developing a process for organizing data.

Plant Meeting, June 23, 2003 in Hot Springs, AR Attendees: Susan Hooks, Mike Brod, Jeff Holmes, Betty Crump, Steve Osborne began work on targets, key factors and indicators.

Plant Meeting, September 3, 2003 in Hot Springs, AR Attendees: Susan Hooks, Mike Brod, data clean-up.

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Appendix A—Public Involvement, Responses to Comments on the Draft EIS/Proposed Revised Plan, and Comment Letters from Federal, State, and Local Agencies and Elected Officials

Public Involvement

Public involvement was encouraged throughout revision of the 1990 Amended Forest Plan. Many opportunities for public involvement were provided during the multi-year process, including 19 public meetings held across the planning area; use of a website where documents were posted as they became available for review and comments could be received; personal contacts; presentations to groups and organizations; news releases; and newsletters. The Plan Revision Team engaged in dialogue with interested groups, agencies, and individuals throughout the revision. In accordance with 36 CFR 219.6, owners of lands intermingled with or dependent for access upon National Forest System lands were notified of forest planning activities along with the general public through notices in the Federal Register, local newspapers, radio announcements, posted bulletins, and the Plan Revision newsletter.

Forest Plan Mailing List

The Plan Revision Team utilized a mailing database to maintain a current list of interested agencies, groups, and individuals. The mailing list was updated via periodic requests through the newsletter, cards at open houses, and specific mail-outs requesting updates. After each mail-out, the mailing list was adjusted to reflect returned items or notification of changes of address. Individual requests to update the mailing list were promptly accommodated. The Forest Plan mailing list was used to solicit preferences on how the draft and final documents were to be distributed.

Plan Revision Newsletter

The *Plan Revision News* newsletter was used to announce all public meetings and was mailed to all persons on the mailing list. Beginning February 2003, Plan Revision newsletters were periodically published and distributed to the forest plan mailing list (consisting of approximately 2,500 individuals, groups, agencies, and organizations). Six issues of *Plan Revision News* were mailed during the period February 2003 to January 2005. The newsletter primarily served as an informational tool to inform interested agencies, groups, and persons of the status of Plan revision and upcoming events. Newsletters were mailed in advance of all public meetings and contained information about the location, time, and subjects to be discussed.

Forest Website

Information posted on the Forest website (<http://www.fs.fed.us/r8/ouachita>) was utilized to keep the public informed and to provide a variety of opportunities to be involved with Forest Plan revision. In addition to information posted to the website, a Forest Plan

revision email address presented the public with the opportunity to interact with the Plan Revision Team on a continuous basis. The website provided a key opportunity for the public to access the proposed Revised Forest Plan, the Draft Environmental Impact Statement (DEIS), the Summary Documents, the Plan map, and the Appendices to the DEIS. Comments on these documents were accepted via e-mail during the comment period.

Ozark-Ouachita Highlands Assessment (OOHA)

The groundwork for revising the Forest Plan began well before the Notice of Intent to prepare an environmental impact statement was published in May 2002. Some of the groundwork was completed between 1996 and 2000, when teams of scientists and resource specialists from the Forest Service, other Federal and State agencies, and universities cooperatively conducted the Ozark-Ouachita Highlands Assessment (OOHA), available at <http://www.srs.fs.usda.gov/pubs/index.htm>.

Working meetings open to the public were held in Little Rock, Harrison, Russellville, Hot Springs, and Fayetteville, Arkansas, and in Springfield and West Plains, Missouri. Hundreds of citizens participated in these meetings. OOHA provided a synthesis of the best information available on conditions and trends likely to affect management of the region's four National Forests—the Mark Twain, Ouachita, and Ozark/St. Francis.

Issue Identification and Notice of Intent

The Notice of Intent to prepare an EIS to accompany the Revised Forest Plan for the Ouachita National Forest was published in the Federal Register on May 1, 2002, and the formal public comment period (scoping) was initiated immediately thereafter. Through the Federal Register, the Forest Plan mailing list, and widespread media coverage, preliminary issues for Forest Plan revision were described and a series of four public meetings was announced. These meetings were conducted in June 2002 to provide information about the revision process and to solicit public comments. These meetings were open to the public in the following cities: Broken Bow and Poteau, Oklahoma, and Hot Springs and Mena, Arkansas. A total of 55 people attended these sessions.

After the Notice of Intent was published, the formal public comment period for defining the scope of the Environmental Impact Statement began and lasted from May 1 through August 2, 2002. Written public comments were received and logged in at the Forest Supervisor's Office in Hot Springs, Arkansas, during this period. A total of 29 emails, cards, and letters were received.

As a result of this public involvement and additional internal scoping, the Forest Leadership Team refined the major issues to be considered during revision. Significant issues were grouped into four major categories, with more specific concerns listed under each:

1. Ecosystem Health and Sustainability
 - a. Oak Decline and Mortality
 - b. Viability of Threatened, Endangered, and Other Species of Concern
 - c. Use of Prescribed Fire in Vegetation Management
 - d. Use of Uneven-aged and Irregular Even-aged Silviculture
2. Land Use Designations
 - a. Changes needed in Water and Riparian Areas, Management Area 9
 - b. Roadless Areas eligible and suitable for Wilderness (36 CFR 219.17)
 - c. Suitability determinations, including land suitable for timber production (36 CFR 219.14 (d))
3. Public Access and Recreational Activities
 - a. Changes needed in management standards and desired conditions for the transportation system within the Ouachita National Forest, including road densities
 - b. Changes needed to address existing and likely future conflicts among dispersed recreation activities
 - c. The mix of developed and dispersed recreation opportunities on the Forest
 - d. Forest Plan direction concerning off road use of motorized vehicles (OHV)
 - e. Relationship of the Ouachita National Forest to Communities
4. Changes in harvest levels and their projected effects on local economies
 - a. Effects of recreation, wildlife-related activities, and tourism on local economies
 - b. Effect of fuels management within the national forest in relation to communities at risk

Off-highway Vehicle Issue

In September 2003, anticipating that growing OHV use and possible changes in existing Forest management direction on OHV use could overshadow the entire Forest Plan revision effort, the Plan Revision Team organized a series of six open houses, or “listening posts,” to gain input from the public. An array of press releases, outreach materials, exhibits, and presentations were prepared. The meetings were held in a variety of locations in Arkansas—Little Rock, Mena, Booneville, Hot Springs, and Mt. Ida—and at one Oklahoma location, Poteau. Meeting locations were chosen so that a wide segment of the public could meet directly with Forest Service staff, share their opinions and concerns, and access information related to OHV policies. While OHV use was the major focus at the meetings, Forest Service personnel also answered questions and addressed other issues related to Forest Plan revision.

Public attendance at the September 2003 meetings was as follows: Little Rock, 34; Mena, 90; Booneville, 31; Hot Springs, 78; Mt. Ida, 92; and Poteau, 62, for a total of 387. Public input was also received via email (138 responses). Independently, a concerned citizen collected signatures at community stores, OHV dealers, and sports suppliers resulting in approximately 2,500 signatures on a petition that was submitted to the Forest Service. The petition supported the opening of roads that are currently closed for use by OHVs.

Forest Inholders

Forest inholders were included on the Forest Plan mailing list and received the Forest Plan newsletters as well as other announcements. The many public meetings held to discuss issues, present inventories, and alternatives, and later to explain the commenting process, all presented excellent opportunities for discourse with inholders on topics related to plan revision, and many took advantage of these opportunities. As a result of interaction in person with inholders and through comments delivered by other means, particular attention was directed to how the Forest Plan addresses use of herbicides, the quality of the transportation system, the maintenance and enhancement of scenery and recreation opportunities, special forest products, OHV use, firewood availability, local economic opportunities, and desires for high quality streams and lakes and abundant wildlife. During Forest Plan implementation, other, more specific, individual concerns of inholders will be addressed at the project-planning level.

Plan Revision Progress and Presentation of Inventories for Comment

In October 2003, a second series of meetings using the open house format was offered. Notification procedures similar to those used to announce the OHV meetings were used. Meetings were held in Mena and Little Rock, Arkansas, and in Broken Bow, Oklahoma. The purpose of these meetings was to inform the public of the status of Forest Plan revision and present some of the work accomplished on needed inventories. Six information stations, manned by Plan Revision Team members, were available to discuss the status of inventories of information necessary for Forest Plan revision: Socio-Economic Data; Land Type Associations; Forest Roads Analysis; Roadless Evaluation; Species Viability Evaluation; the Scenery Management System and Recreation Opportunity Spectrum. Attendance at the second set of Open Houses was nominal, with only 44 members of the public visiting with Forest Service personnel. Visitor attendance at the three locations follows: Mena, Arkansas—22; Little Rock, Arkansas—12; and Broken Bow, Oklahoma—10.

Alternative Development

In April 2004, three Open Houses were held to provide information on the development of the draft alternatives. Information on five draft alternatives was available for discussion, including the 1990 Amended Forest Plan (the “no action” alternative). These meetings were open to the public in Poteau, Oklahoma; and Mt. Ida and Hot Springs, Arkansas. A total of 65 people attended these meetings with attendance as follows: Poteau, Oklahoma—6; Mt. Ida, Arkansas—27; and Hot Springs, Arkansas—32. Independently, but at about the same time, the Arkansas Chapter of the Sierra Club developed and presented a “Citizens’ Forest Plan” to the Forest Service for consideration.

Notice of Availability of the Proposed Revised Forest Plan and Draft EIS; 90-Day Comment Period

The proposed Revised Forest Plan and the Draft Environmental Impact Statement were distributed for public comment using the Forest Plan mailing list. A mail-out asking respondents to identify how they preferred to receive the documents for comment preceded the formal distribution of documents. The distribution of the proposed Revised Forest Plan and the DEIS occurred immediately before the formal public notification via the Notice of Availability published in the Federal Register on February 25, 2005. The date of publication in the Federal Register established the required 90-day public comment period, which ended on May 27, 2005.

How-to-Comment Meetings

In order to communicate the status of Plan Revision and to prepare the public to effectively comment on the draft documents, a series of three public meetings was held. Public meetings to discuss the draft Plan and DEIS were held February 28, 2005 in Poteau, Oklahoma; March 1, 2005 in Hot Springs, Arkansas; and March 3, 2005 in Mount Ida, Arkansas. A total of 100 people attended these meetings with attendance at as follows: Poteau—15; Mt. Ida—66; and Hot Springs—19.

Comments on the Revised Forest Plan and Final EIS

The Forest received 478 documents, including two petitions, during the formal comment period. The Plan Revision Team reviewed and analyzed all written comments that were received or postmarked by the end of the comment period. Each document was numbered as it was received. Each substantive comment was assigned a number.

Agency responses to substantive comments were completed by the interdisciplinary team and approved by the Forest Supervisor. A substantive comment is one that is within the scope of, is specific to, and has a direct relationship to the proposed action and includes supporting reasons for the Responsible Official to consider. The scope of the issues addressed in the DEIS was established after publication of the Notice of Intent in the Federal Register in May 2002 and following four public meetings in June 2002.

Consistent with Forest Service directives, copies of comments received on the DEIS and the Proposed Revised Forest Plan from Federal, State, and local agencies and elected officials are included in this appendix (following Responses to Comments on the DEIS and Proposed Revised Forest Plan).

A summary of changes made to the proposed Revised Forest Plan and the EIS appears in the Record of Decision. The Forest Service expresses its sincere appreciation to all who commented and is grateful for the recommendations and critiques received.

Responses to Comments from the Public, Other Agencies, and Elected Officials

The Forest Service received comments on the draft documents in various formats, as listed in the following tabulation:

Format	Definition
Comment Card	Card available at Open House meetings or from newsletters
Post Card	Card with comment
E-Mail	Messages received by E-Mail
E-Mail/Form Letter	A form letter received by E-Mail
Modified E-Mail/Form Letter	A form letter received by E-Mail but altered with personal comments
Letter	Self explanatory
Form Letter	A letter identical in content but with differing signatures
Petition	A message with multiple signatures

During the comment period, 478 documents were received. The following tabulation displays the number of each type of document received:

Format	# Received
Comment Card	1
Post Card	4
E-Mail	71
E-Mail/Form Letter	246
Letter	57
Form Letter	98
Petition*	2
Total	478

*One petition was filed as an attachment to a comment letter. It was counted as a letter, but also recorded in this tabulation.

For each substantive comment reviewed, the interdisciplinary team determined an appropriate response from among the following options:

- Modify alternatives, including the proposed action
- Develop and evaluate alternatives not previously given serious consideration by the agency (not used)
- Supplement, improve, or modify the analyses
- Make factual corrections
- Explain why the comments do not warrant further agency response, citing the sources, authorities, or reasons which support the agency's position and, if appropriate, indicate those circumstances which would trigger agency reappraisal or further response.

All documents did not contain substantive comments, but some documents contained more than one substantive comment. Similar comments were grouped, and responses to the grouped comments were prepared. The comments and comment responses are documented in this report.

Every comment received was read, and many of these comments helped the interdisciplinary team refine and clarify the plan documents. During the review process, many valuable suggestions and ideas were presented that were not within the scope of plan revision and, therefore, were not “substantive.” However, it is important for all who commented to know that their views are valuable and will inform implementation of the Revised Forest Plan.

**Responses to Comments on the Proposed Revised
Land and Resource Management Plan for the Ouachita National Forest
and the Accompanying Draft Environmental Impact Statement**

Proposed, Endangered, Threatened, and Sensitive Species and Other Species of Concern

Agency Concern: Management of Federally Listed (Proposed, Threatened, or Endangered) Species

Doc#	Cmt#	Comment
292	79	"We [US Fish and Wildlife Service] offer our staff experts for final collaborative development of standards for the following listed species known to occur on or adjacent to the Ouachita National Forest: Indiana Bat, American burying beetle, Bald Eagle, Red-cockaded Woodpecker, Leopard Darter, Ouachita rock pocketbook, Scaleshell, Winged mapleleaf, Harperella, Pink mucket, Arkansas fat mucket."
292	80	"...standards will not be needed for the following species....Piping Plover, Interior Least Tern, American alligator."
292	89	"While bird species can be an indicator of habitat condition, the DEIS cites only two references for endangered birds, each dating from the 1980s....use of more current data on bird occurrence may aid in determining the ecological status of habitat condition....trends in bird occurrence can be accessed from the URL http://www.pwrc.usga.gov/bbs/ ."
292	94	"Impacts to federally listed species are not 'mitigated'. If road construction may affect or result in the possibility of 'take,' endangered species consultation should be initiated."

Response

The Revised Forest Plan benefited greatly from the collaborative effort with the USFWS to refine management direction for federally listed and proposed species. Design criteria specific to listed species and groups of listed species were added to the final Revised Forest Plan. The literature citations for all the species of viability concern, including Proposed, Endangered, Threatened and Sensitive (PETS) species addressed in the "Species Viability Evaluation" (which utilized nearly 800 of the most current scientific publications and information available) are available at this link: <http://www.fs.fed.us/r8/ouachita/planning/index.shtml>; short references to these sources of data (author, year) are presented in Appendix E with each species included in the evaluation. The most recent Ouachita Breeding Bird Surveys and Arkansas Natural Heritage Commission element occurrence records (EORs) were used in the Species Viability Evaluation; however, ornithology experts such as Doug James/University of Arkansas, Catherine Rideout/Arkansas Game and Fish Commission, Jim Bednarz/Arkansas State University, Bill Shepard/Audubon Society, Chris Kellner/Arkansas Tech University, and Bill Hollimon/Arkansas Natural Heritage Commission were the primary sources of local expert information concerning the status of bird species of concern on the Ouachita NF. References to "mitigation" were removed and replaced with more appropriate language aimed at avoiding impacts to federally listed species and, as needed, consulting with the USFWS.

Public Concern: Management of Federally Listed (Proposed, Threatened, Endangered) and Sensitive Species

337	150	"The Draft Plan should include a provision for all rare and sensitive species to be inventoried wherever they occur, whether in Suitable for Timber areas or not."
337	156	"Protection of federally listed threatened and endangered species should be the highest priority of the plan. This is what the Endangered Species Act requires...Detailed and enforceable standards and guidelines should be developed for the protection of each listed species. Species identified as state listed should also be given top priority."
375	256	"Inventories of all endangered species should be collected. The benefit of the doubt in protecting endangered species should go toward the species."

Response

The Revised Forest Plan includes many provisions regarding federally proposed, endangered, threatened, and sensitive (PETS) species, including an objective to "maintain or improve the population status of all species federally listed or proposed for listing" and both Forest-wide and Management Area-specific standards for managing habitat for PETS species. As noted in Forest Service Manual (FSM) 2671, the Forest Service "cooperates with State agencies to inventory, protect, manage, and plan for threatened, endangered, proposed, and sensitive species." Southern Region supplement R8-2600-2002-2 to the FSM (Chapter 2670) provides guidance to determine when project-level inventories of such species are needed. No additional Forest Plan guidance is warranted.

Agency Concern: Wildland Fire Suppression Concerning Proposed, Endangered and Threatened Species

Doc#	Cmt#	Comment
292	98	"[Wildland Fire Suppression] Add the following text: 'When catastrophic wildfire events occur on the Ouachita National Forest that threaten known federally listed species or other important forest resource, the local FWS Ecological Service Field Offices would gladly provide support when the incident commander deems it necessary for minimizing impacts and emergency consultation.'"

Response

The Forest Service appreciates the willingness of the USFWS to be available, as needed, during catastrophic wildfire events when federally listed species may be affected; however, coordination and consultation procedures in such circumstances are adequately addressed in existing interagency agreements and agency directives.

Agency Concern: Red-cockaded Woodpecker/Pine-Bluestem Management

Doc#	Cmt#	Comment
292	90	"We would like to see the range [for the pine blue stem subsystem] narrowed to the higher side of the previously stated range, (i.e., from 7-20 percent to 12-20 percent) [of all known pine-oak dominated systems]. This will facilitate the recovery of the Red-cockaded Woodpecker through a greater expansion of dependent habitat types, maintenance of this subsystem, and subsequent positive effects on ...species associated with this subsystem... help reduce grazing allotment pressure on existing openings and riparian corridors...by expanding the forage base outside of just those areas and providing alternative forage sites....[and] potentially reduce impacts to sensitive aquatic species, such as the leopard darter."

Response

In addition to the shortleaf pine-bluestem grass and pine-oak ecosystem restoration taking place in MAs 21 and 22, the Revised Forest Plan projects that an additional 70,000 acres of this pine-bluestem or pine-oak woodland will be restored and that, by 2021, approximately 350,000 acres will be in one of these woodland conditions. Based on these projections, it is highly likely that the upper end of the stated range of desired conditions for pine-bluestem ecosystems will be achieved. If additional habitat for Red-cockaded Woodpeckers is needed (outside the existing designated Habitat Management Areas), some of the pine-oak woodland should be suitable, particularly if the prescribed burning frequency meets objectives.

Public Concern: Indiana Bat Management

Doc#	Cmt#	Comment
337	184	"The FS must prohibit logging, mining, off-road vehicle use, application of chemical agents, and prescribed burning in or near areas of known bat populations, particularly known summer roosting areas and hibernacula. Known hibernating caves should be gated and monitored for malicious activities in or near the caves... Eliminating alteration of habitat is essential if populations of these endangered bat species are to recover."
337	187	"The ESA requires the FS to use "the best scientific and commercial data available" to fulfill its Section 7 obligations. The analysis needs to consider the summer habitat required by female Indiana bats for maternity roosts (e.g. roost trees, protection from disturbance, and foraging habitat). The analysis also needs to consider the summer roosting and foraging needs of male Indiana bats."

Response

The only endangered bat species known to occur on the ONF is the Indiana bat, which is represented during some months by 1 to 10 individuals hibernating in a protected crevice cave in southeastern Oklahoma. The Forest Service worked closely with the USFWS to ensure that the Revised Forest Plan appropriately addresses all concerns about Indiana bats on the Forest, including habitat management recommendations from the USFWS Indiana Bat Recovery Plan. Two additional standards to address Indiana bat conservation have been added since the proposed Revised Plan was published.

Public Concern: Mountain Lions

Doc#	Cmt#	Comment
337	157	"The Forest Service must give full consideration to the habitat needs of the mountain lion...increasing number of verified sightings of this animal in Arkansas...planning for their protection...ONF has been identified by the USFWS as one of a few ideal locations for reestablishing the cougar...revised Forest Plan must account for these habitat needs...likely that mountain lions in Arkansas deserve protection under the federal Endangered Species Act..."

Response

The mountain lion was not included in the biological evaluation of "species of viability concern" based on the recommendations of the Arkansas Game and Fish Commission Non-game Mammal Program Coordinator and other local mammal experts and current best science as cited below. There is considerable doubt that any wild mountain lions exist on the Ouachita NF, although lions are known to have escaped from confinement or been released in the Ouachita Mountains. Nonetheless, habitat management recommendations for the mountain lion are compatible with the Forest biodiversity management direction.

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2. Arkansas Natural Heritage Inventory. 2003. Arkansas element of occurrence records.
3. Clark, D.W.; White, S.C.; Bowers, A.K.; Lucio, L.D.; Heidt, G.A. 2002. A survey of recent accounts of the mountain lion (*Puma concolor*) in Arkansas. Southeastern Naturalist. 1(3):269-278.
4. Sasse, D.B. 2001. Status of pet mountain lions (*Puma concolor*) in Arkansas. Proceedings of the Arkansas Academy of Science. 55:188.
5. Witsell, T.; Heidt, G.A.; Dozhier, P.L.; Frothingham T.; Lynn, M. 1999. Recent documentation of mountain lion (*Puma concolor*) in Arkansas. Proceedings of the Arkansas Academy of Science. 53:157-158.

Public Concern: Direct Impacts of Management on Individual Animals (Species or Groups of Concern)

Doc#	Cmt#	Comment
337	174	"The Forest Service needs to develop alternatives and mitigation measures to minimize the death and suffering the logging causes. For example, the alternative/mitigation measure of not cutting in the nesting season needs to be developed and considered. The analysis also need to disclose the indirect impacts to the species that are not directly killed by the trees being cut down or run over by logging equipment....please explain why you believe killing and causing pain and suffering to forest creatures is justified so that you can get the cut out."
337	175	"The analysis needs to address this [Migratory Bird Treaty Act] prohibits the direct take of migratory birds, nestlings and eggs by persons] and develop mitigation measures to assure the loggers will not violate the MBTA [such as limiting logging to winter months]."
337	180	"The impacts of compaction, vegetation removal and erosion must be considered [on invertebrates and microorganisms]."
337	182	"Research indicates logging devastates salamander populations." "...effects to these species needs to be evaluated."

Response

The Biological Assessment, Biological Evaluation, and EIS for this plan revision present the results of a thorough and careful analysis of the effects of logging, compaction, and erosion (among other possible influences) on Proposed, Endangered, Threatened, and Sensitive species and other species of viability concern. These documents acknowledge that some individual plants or animals may be harmed within a project area during certain management activities. How forest management activities affect federally listed species and how they affect overall population viability and persistence of sensitive species within the landscape are evaluated at the project-level in Biological Evaluations. Timber harvesting activities are seasonally limited (see Forest-wide Soil and Water standards) to avoid soil compaction. The primary preferred habitat of most salamander species known to occur on the Forest is within streamside management areas, which are excluded from most ground disturbing activities; most upland slopes that Ouachita-endemic salamander species use (generally moist, north-facing ones) will not be subject to extensive logging under the 2005 Revised Forest Plan.

Public Concern: Mercury in Fish

Doc#	Cmt#	Comment
337	126	"The DEIS fails to analyze and disclose the very serious cumulative impact of <i>mercury</i> in minute amounts washing from Ouachita soil and rocks and adding to the build up of mercury in fish."

Response

Mercury in its elemental form is found throughout the Forest. It is when mercury goes through an anaerobic methylation process that it becomes available for biotic uptake. Erosion and sedimentation are not contributing to this process.

Management Indicator Species

Public and Agency Concern: Aquatic Management Indicator Species

Doc#	Cmt#	Comment
143	55	"...impractical to use smallmouth bass (<i>Micropterus dolomieu</i>) as the sole management indicator species (MIS for larger stream of the forest (pg 3-103)...include the presence and/or absence of intolerant fish species found in riffle communities.)"
374	244	"Under the guidelines of Management Indicator Species (MIS), the revised plan falls short in species indicative of the various aquatic systems within the National Forest boundary... For the Ouachita National Forest, the health of the aquatic community and especially the fish population, would be best monitored by conducting fish samples targeting the entire community, utilizing the Index of Biotic Integrity (IVI) or a modification following Karr's work)... We support a monitoring system that samples every stream within a three (3) to five (5) year rotation."
259	70	"...recommend that the Forest Service also use a community metric, such as the index of biotic integrity, to track the health of river and stream communities."

Response

The Management Indicator Species list has been expanded significantly by restoring the fish MIS in place prior to revising the Forest Plan. Certain streams and segments of other streams are permanent monitoring stations and are surveyed on a three-to-five year rotation using Basin Area Stream Survey methodology.

Public Concern: Terrestrial Management Indicator Species

337	145	<p>"The list of MIS provided in the Draft Revised Plan is minimal and weighted toward species that benefit from logging...The Plan should also include as MIS, the eastern gray squirrel for mature forests...more forest interior species, such as the cerulean warbler and those listed in association with the wormeating warbler, should be included as MIS...very important to include appropriate salamanders as MIS...due to planned heavy burning, the yellow lady slipper should be a MIS...the current list [MIS] also lacks indicators for water quality, such as the fat mucket muscle, the longnose darter, and the Ouachita Mountain Shiner. Other appropriate indicators for water quality should include those listed for the appropriate ecoregion in Arkansas Department of Environmental Quality, Regulation No. 2, Water Quality Standards. The revised list of MIS should also include large predators, as they are at the top of the food chain. In addition to the mountain lion, the black bear is also an appropriate choice...The Plan should include key species which are primarily dependent upon large cavities for breeding and winter cover such as the Barred Owl, Eastern Gray Squirrel, Eastern Fox Squirrel and Black Bear."</p>
337	148	<p>"The Forest Service MIS category list ignored a habitat category which is in very short supply. This category is for late successional unfragmented forest which is very important for some migratory bird species such as the Cerulean Warbler. It is not sufficiently widespread because late successional unfragmented forest is not widespread."</p>
356	202	<p>"The preferred alternative places emphasis on maximizing game and disturbance-dependant species populations, using a short list of indicator species. We recommend that management activities should try to stabilize, rather than maximize, game species populations while placing emphasis on naturally occurring wildlife diversity."</p>

Response

The scarlet tanager (*Piranga olivacea*) is a neo-tropical migratory bird of international concern (Partners in Flight and Project Tanager). This species, which is area-sensitive and usually not found in habitat patches smaller than 100 hectares (250 acres), is commonly found in mature hardwood and hardwood-pine habitats on the Ouachita NF. As an MIS, the scarlet tanager addresses concerns about forest fragmentation as well as mature forest habitats. Another MIS that reflects less disturbed habitat conditions is the pileated woodpecker. The 17 aquatic MIS from the Amended Forest Plan have been retained in the revised Plan; some of the Arkansas Department of Environmental Quality recommended MIS are inappropriate for the Ouachita NF because they either do not occur in streams within the Forest or occur in such low numbers that they cannot serve well as MIS. Large predators are not appropriate MIS due to the difficulty of obtaining accurate population estimates. The habitats of the yellow lady slipper and endemic salamanders are already protected due to their status as Southern Region Sensitive species; more importantly, they are not good candidates to serve as MIS due either to the extreme difficulty in accurately tracking population trends (salamanders) or, in the case of the lady's slipper, because its population trends indicate little if anything about the effects of management (because all populations are protected within Management Area 9, Water and Riparian Communities).

Public Concern: Purpose of Management Indicator Species

337	149	<p>"The purpose of MIS is to detect significant changes in a certain area...what kinds of changes make up "significant changes" ...Through the use of cutting, herbiciding, and repeated burning, the Forest Service drastically changes the very core of the forest, i.e. stand structure, stand composition, sexual reproduction, and the forest floor. The Forest Service, in the Draft Plan, must address concerns about 'significant changes' – what are they and what has the public complained about in the past."</p>
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Response

Management indicator species (MIS) are selected "because their [Forest-wide] population changes are believed to indicate the effects of management activities" (36 CFR 219 (a)(1)), particularly for comparing Forest Plan alternatives. The diversity of habitats and life histories represented by the pileated woodpecker, scarlet tanager, prairie warbler, red-cockaded woodpecker, wild turkey, northern Bobwhite, and the stream and pond MIS for the Ouachita NF are adequate to address the intended purpose of designating MIS.

Recreation

Public Concern: Recreation, General

Doc#	Cmt#	Comment
356	201	<p>"Recreation... the preferred alternative provides no recognition of water-based recreation as a primary forest use. We recommend that water-based activities be recognized and emphasized as a primary forest recreational use, and that this emphasis be reflected in the final planning document... We request that addition of more and better quality hiking trails be added as a plan element."</p>
378	263	<p>"...heavy use points directly to the need for more recreation opportunities as noted by the Southern Research Station in 1999...this issue is not adequately addressed in the plan. We urge you to seek increased funding for maintenance and repair of all existing facilities and to designate new ones."</p>
378	270	<p>"Uncertainty about the cost and availability of fuels create the desire and need to seek recreation closer to home. The time is right for USFS in Arkansas to shift their primary focus from timber products to conservation and recreation."</p>

Response

The Forest added more specific references to water-based recreation in the Plan (Part 1). Future trail construction, as noted in Part 2 of the Plan (Public Use and Enjoyment priorities and objectives), will be considered when "partnerships are in place to support trail maintenance long term." Efforts will continue to augment the budget for public recreation and outdoor activities and to pursue partnerships that leverage available funds to the greatest extent possible. Use projections (by activity) for the next 45 years (Table 3.98, DEIS; Table 3.102 in FEIS) indicate that the highest growth in Forest recreational activities is in viewing scenery, viewing wildlife, general relaxing and hiking/walking—which would not require significant additional developed recreation. Developed camping, swimming and picnicking show modest projected gains for the next two decades. Although, dispersed recreation uses of many kinds are increasing, adequate facilities and locations for most recreational activities should be available to satisfy future demand.

Public Concern: Integrity of Trails and Trail Corridors

Doc#	Cmt#	Comment
61	30	"...plan neglects to include language providing proper trail corridor protection...protected from logging and controlled burn activities."
80	32	"[thinning and burning] should be held to a minimum within a 100' corridor on each side of the trails...hikers also want to see outward and not feel 'fenced in' by a narrow trail corridor."
82	33	"Plan does not adequately address trail management and trail protection issues...eliminates Management Area 18."
82	34	"...alternatives uses(s) the same list of Management Areas...add a specific Management Area for Trails and Trail Protection Policy to your proposed plan."
82	35	"...specific standards should identify trail protection considerations...when cutting is required, destruction of the corridor should be minimized...Controlled burns should be limited in intensity within the corridor to prevent killing tress near the trail. Removal of tress should be acceptable only if such removal would not be harmful to the health, maintenance patterns, and scenic values of the trail."
86	37	"...it is [not] appropriate to exclude a MA for trails and retain MA 3 (Developed Recreation)...trail 'standards' and related 'management practices'...are [not] adequately addressed in the proposed Plan."
86	38	"Insect and disease control cuts, controlled burns, and other forest practices within the trail corridor should be done to different standards than those outside of the corridor. When cutting is required, the smallest and least destructive machinery should be used in a way that minimized damage. Controlled burns can and should be limited in intensity within the corridor to prevent killing area near the trail."
86	39	"...language needs to be added to the Plan which states that conditions within all trail corridors have priority over management of the surrounding areas. Removal of trees, controlled burns, etc. would be acceptable only if the planned action would not be harmful to the health, maintenance patterns, and scenic values of the trail."

Response

Two standards have been added to address this concern:

VM003 Whenever proposed projects may affect a recreation trail, consult with the Forest Landscape Architect (or his/her designated representative) to determine how best to minimize impacts on the trail, minimize future vegetation encroachment on the trail and meet the assigned Scenic Integrity Objective. Retain sufficient overstory vegetation above and immediately adjacent to the trail to reduce opportunities for blackberry vines and other vegetation that impede non-motorized travel to flourish.

TH011 Timber harvests located near recreation trails will be conducted with mitigation measures appropriate for the trail Concern Level and the Scenic Integrity Objective of the area. Where skid trails or skidders must cross the recreation trail, the number of crossings should be minimized and crossings should be made at right angles unless doing so would result in greater damage to the trail than crossing at another angle. The affected trail tread will be restored when the timber harvest is completed. The Ouachita National Recreation Trail was added to the management area map to underscore this trail's importance in relationship to any nearby management activity.

Management Area 3, Developed Recreation Areas, and Management Area 18 in the 1990 Forest Plan have different resource management objectives. MA 3 provides a desired condition for developed recreation areas to meet requirements of places that are

considered destinations by the visiting public. Trails provide a linear, changing recreational experience while the participant travels through an area. Trails differ from recreation areas in that the environment of the trail changes from place to place as it passes through different MAs with differing landscapes and management emphases. Forest-wide standards for trails accommodate this difference and mitigate the potential impacts of management activities routinely undertaken in the vicinity of trails but which would not be allowed near recreation areas. The Forest-wide standards are designed to respond to a trail's varied and changing linear environment by not confining management for the trail to a set corridor width.

While the Forest strives to maintain the integrity of the trail system, it would not be possible to give highest priority to maintaining a given recreation trail above all else. For example, trails near Threatened, Endangered, or Sensitive species habitat are secondary in importance to the needs of the species at risk. Similarly, trails in areas with special designations, such as wilderness, are secondary in importance to the original purpose of the area.

Public Concern: Use of the Ouachita National Recreation Trail

Doc#	Cmt#	Comment
73	31	"...the [Ouachita] trail should be allowed to be used by any non-motorized method as long as it is in a way that does not permanently damage the trail."
Response		
The Ouachita National Recreation Trail was originally a hiking trail. In 2001, a proposal to allow mountain-type bicycles to utilize a portion of the trail was considered. This proposal, preceded by favorable findings of a 3-year trail impacts study and public input on a 50-mile segment of the trail, was approved, and two sections of trail totaling 137 miles were opened to bicycle use. Because the Ouachita Trail was originally designed and constructed for hiking, and design criteria and construction methods and materials were applied with that use in mind, no other uses with the exception of bicycles have been considered. The trail remains closed to other types of non-motorized travel such as horses and pack animals because the design of the trail would not support such use.		

Public Concern: Trail Impacts – All Uses

Doc#	Cmt#	Comment
20	5	"Same rules should apply to horse back riding and non motorized bikes as they, too, will cause as much if not more damage than OHV's are accused of."
Response		
The Forest agrees that horseback riding and bicycle riding can create similar impacts to the forest floor if repeated use is sustained over time in areas not intended or designed and constructed for such uses. The major differences between such uses and OHV use are that significantly larger numbers of OHV users are riding on the forest floor compared to horse and bicycle riders and that there are significantly more user-defined routes and trails attributed to OHV use than to horse and bicycle use. It is the large numbers of OHVs using the forest floor that have created the need to manage this activity.		

Public Concern: Cumulative Impact of Off-Highway Vehicles (OHVs)

Doc#	Cmt#	Comment
11	2	"ATV policy...all of them are going to pile in on a few roads and trails"
34	7	"[OHV policy] ... will put all use on a limited number of places and cause a higher incidence of erosion on these areas."
111	54	"...public should be allowed to ride their ATV's on as many roads and trails as possible to have the least impact on the national forest area...crowding ATV riders in a few certain areas is not a good idea and should have more analysis and public comments before any decision is made."
145	57	"decreasing impact by ATV's, which seem to do much more damage than almost any other kind of use"
378	265	"In MA. 17, we simply ask that no increased use of ORV be permitted as the noise impacts negatively on all other forest users."

Response

The desired effect of making the Forest floor unsuitable for OHV use and the eventual anticipated effect of redirecting some of that use to designated routes and trails would be to reduce existing and potential future environmental impacts. The EIS discussion of effects from OHV use has been supplemented. The Forest anticipates eventually making more well designed, constructed and properly maintained routes available to the public, with the necessary related facilities such as parking areas, signage and sanitation facilities, so that the recreational experience of using an OHV on the Ouachita NF would not be degraded and no individual route or trail is impacted beyond its carrying capacity. The Forest retains its ability to temporarily or permanently close overused routes and undertake other means to ensure unacceptable resource damage does not occur.

Nationally, the Forest Service has made clear, through many means, including statements by the Chief of the Forest Service, that OHV use of the national forests is a legitimate recreational activity but one that needs to be better managed. The proposed change in management direction making cross-country OHV use unsuitable is a measured response to the current and reasonably anticipated impacts resulting from increased OHV use. The move from considering uncontrolled forest floor use of motor vehicles a suitable use to an unsuitable one (where the use of motor vehicles of all types is allowed on a system of designated routes and trails but not elsewhere on the Ouachita NF) should significantly reduce environmental impacts associated with OHV use. The Forest will closely monitor the use of any new system of designated routes and trails for OHVs and will make adjustments and modifications where necessary to protect environmental values.

Public Concern: OHVs for Game Retrieval

Doc#	Cmt#	Comment
20	4	"Cross country OHV use be limited to game retrieval only."
357	204	"We support this policy [OHV] because it should reduce disturbance to wildlife resources, vegetation and soil. However, we are sensitive to the needs of non-ambulatory sportsmen and would like to see sufficient flexibility in the OHV restrictions to allow their use of OHVs off designated trails during hunting seasons. We believe this could be done with minimal natural resource impact because of the limited number of vehicles that would be involved. Further, non-ambulatory sportsmen use of OHVs would occur during the fall, outside of the typical nesting period for ground-nesting birds and mammals, and relatively level areas could be designated for this purpose to minimize potential erosion concerns."

Response

Between the draft and final EIS, the Forest analyzed the option of allowing game retrieval as part of Alternative D; however, it was determined that it was not feasible or reasonable to allow one cross-country use of motorized vehicles and declare all other such public uses unsuitable. The effects of making cross-country travel by motorized vehicle unsuitable are discussed in the FEIS.

Public Concern: Designated Routes for OHVs

Doc#	Cmt#	Comment
91	40	"We don't need any trails made just let our citizens ride the old logging roads which have a solid soil base."

Response

The Revised Forest Plan establishes management direction that cross-country motorized travel is unsuitable. Subsequent to Plan approval, a separate process will be used to designate routes. The move to designated trails and roads will occur after appropriate public involvement and will probably incorporate many existing roads already constructed in the Forest. Some roads, however, are not suitable for sustained and repeated use by motorized vehicles or safe for users. Some trails may need to be constructed to link existing travel routes together or to aid in creating loop routes or to enhance the OHV riding experience by participants. Designation of routes is expected to be completed within the next four years.

Wilderness Recommendations and Other Special Land Allocations; Wilderness Management

Public Concern: Wilderness

Doc#	Cmt#	Comment
111	53	"[no more] wilderness designations because these areas cannot be properly managed."
375	250	"Designate as wilderness study the following areas; Blue Mountain, Brush Heap, Cedar Mountain, Flood Mountain, Fourche Mountain, Irons Fork Mountain, Leader Mountain Little Missouri, Middle Mountain, Statehouse Mountain, Gap Creek, Boar Mountain and Little Blakely."
356	199b	"We also recommend that more areas be set aside and preserved — these areas to be excluded from extractive uses."
378	262	"... heartily endorses your new recommendations for wilderness under <u>Alternative D</u> that would include: Brush Heap, 8,353 acres in Arkansas; Blue Mountain, 11,678 acres in Arkansas; Irons Fork, 8,303 acres in Arkansas; Flatside additions, 620 acres in Arkansas; Upper Kiamichi additions, 1,096 acres in Oklahoma"
378	261	"The Ozark Society finds much to be happy about in <u>Alternative E</u> and supports it with one significant exception. <u>Land Allocation in Alternative D should replace and be incorporated into the Land Allocation in Alternative E.</u> " [emphasis in original]

Response

The Revised Forest Plan proposes no new wilderness areas but does recommend adding 1,793 acres to existing wilderness areas (Flatside—620 acres, Upper Kiamichi—1,096 acres and an addition to Poteau Mountain [East Unit]—77 acres). Blue Mountain, Brush Heap, and Irons Fork Mountain remain in Management Area 17, where their semi-primitive character will be conserved.

The wilderness needs assessment indicated significant unused wilderness capacity exists within the six designated wilderness areas on the Forest. As a result of the analysis conducted for this plan revision, no compelling need to add additional areas to the Ouachita NF's inventory was identified.

Public or Agency Concern: Fire in Wilderness and Other Special Areas

Doc#	Cmt#	Comment
374	240	"...strongly supports the appropriate use of prescribed burning, in keeping with the Smoke Management guidelines developed by the state. This would include those portions of designated wilderness areas that are economically feasible in conjunction with adjacent burns."
378	269	"We simply ask and urge the FS, specifically, to NOT use prescribed fire in designated Wilderness, Proposed Wilderness Areas, National Wild and Scenic River Corridors and their respective watersheds, Special Interest Areas and Research Natural Areas."

Response

Prescribed natural fire ignited by lightning or authorized employees for the purpose of reducing dangerous fuels or restoring natural processes in wilderness areas may be used if it is required to meet wilderness management objectives (see Management Area Design Criterion 1a.14). Prescribed fire also may be used to maintain, restore, and enhance native forest communities in special interest areas (Management Area Design Criterion 2.02) and in wild and scenic river corridors where care is taken to minimize visual impacts (Management Area Design Criterion 20.04). Prescribed fire will not be used on any research natural area on the Forest.

Public Concern: Allocation of Semi-Primitive Areas

Doc#	Cmt#	Comment
54	12	"...the Lynn, Kiamichi, Blue Bouncer, Walnut Mtn. area of SE LeFlore County... is being allocated to MA-14 "

Response

In the Revised Forest Plan, these areas are allocated to MA 17, Semi-Primitive Areas.

Public Concern: Wild and Scenic Rivers and Large Conservation Areas

Doc#	Cmt#	Comment
356	200	"The preferred alternative doesn't meet the public need and desire for protected areas, with only 18% of the forest acreage protected. It preserves only narrow corridors of Wild and Scenic Streams and provides no large conservation areas. Research Natural areas are inadequate."
358	215	"...preferred alternative should vastly increase the amount of the Ouachita NF that should be protected as wild and scenic streams and large conservation areas."
378	266	"The Ozark Society fully supports the inclusion of the other eligible rivers for consideration as worthy additions to National Wild and Scenic Rivers. We would ask that the Ouachita National Forest pursue Wild and Scenic River status for the segments of these rivers within the forest."

Response

The Forest Plan includes two large conservation areas (Habitat Management Areas HMAs) specifically for Red-cockaded Woodpeckers and associated species; one covers more than 84,000 acres in western Arkansas; the other, nearly 51,000 acres in Oklahoma. The effective size of these conservation areas is actually much larger, because much of the land surrounding these HMAs is managed similarly. The 2005 Revised Forest Plan is designed to sustain not only the rare species such as the Red-cockaded Woodpecker but all native plants and animals that live in or complete an important part of their life cycle within the Forest.

We have carried forward a previous recommendation that the Glover River be considered for designation as a Wild and Scenic River and noted the eligibility of many others for further consideration by the states. The Forest does not control or manage the majority of lands adjacent to these streams and, therefore, must defer to the appropriate state agency for the respective suitability studies. For this planning cycle, the Forest will continue to manage public lands adjacent to each eligible river segment allocated to Management Area 20 in a manner that maintains their identified "outstandingly remarkable features." A new research natural area—R.R. Reynolds RNA on the Crossett Experimental Forest—has been designated.

The Revised Forest Plan places approximately 136,000 acres in Management Area 17 (semi-primitive areas) and will defer major timber harvest and road construction for the planning period in some of these areas.

Agency Concern: Special Features of South Fourche Special Interest Area

Doc#	Cmt#	Comment
110	51	"...addition to the South Fourche Special Interest Areas is warranted."

Response

The boundary of the South Fourche Scenic Area has been adjusted to encompass the additional special communities and habitats there, and the area has been re-designated the South Fourche Botanical Area in the Revised Forest Plan.

Public Concern: Map of Special Area Allocations

Doc#	Cmt#	Comment
337	139	"No readable maps were provided showing; wilderness areas, roadless areas that were rejected in the analysis process, special areas, natural areas, wild and scenic river corridors, roadless areas that were rejected from wilderness addition, et cetera."

Response

The management area map accompanying the draft and final documents clearly depicts wilderness areas, wild and scenic river corridors, and most special interest areas; research natural areas are not mapped to reduce opportunities for deliberate or inadvertent interference with research studies. Areas meeting roadless criteria are not automatically allocated to particular management areas and do not represent a management area allocation or designation in and of themselves; therefore, they do not belong on the same map with management areas. Maps of inventoried roadless areas were presented at several public meetings and were available for inspection in the Forest Supervisor's Office during plan revision. Additional explanation regarding the roadless area inventory and wilderness evaluation has been included in the FEIS.

Public Concern: Designation of Blowout Mountain as Scenic Area

Doc#	Cmt#	Comment
111	52	"[reconsider] designation of 526 acres on Blowout Mountain as a Scenic Area because the timber cannot be managed properly if the area receives this designation. If the areas has wind damage or insect damage, that affected area needs to be salvaged to keep the area healthy."

Response

Blowout Mountain is managed as a scenic area under the 1990 Amended Plan. Additional safeguards that allow treatments for pests have been proposed in the Revised Forest Plan. The Revised Forest Plan allows salvage of trees in scenic areas following natural catastrophic events.

Inventoried Roadless Areas

Public Concern: Areas Managed as Roadless

Doc#	Cmt#	Comment
165	67	"Roadless Areas: We support the continued management of the 6 inventoried roadless areas (Bear Mountain, Blue Mountain, Brush Heap, Little Blakely, Rich Mountain, Beech Creek) as if the 2001 Rule were in effect...should not be subject to logging, road building or other intensive managements, whatever the outcome of the court proceedings."

Response

As a result of the roadless analysis and wilderness evaluation conducted for this revision and the alternative selected by the Responsible Official, Beech Creek will remain in Management Area 19 as Beech Creek Botanical Area and Beech Creek National Scenic Area and will be managed to protect and further the scenic and botanical values identified in the legislation that designated these areas. Rich Mountain moves from Management Area 19 to Management Area 2, Special Interest Areas, where it will continue to be managed for natural, botanical, and recreational values. The Bear Mountain area will be managed as part of Management Area 16, Lands Surrounding Lake Ouachita and Broken Bow Lake, where its recreational, aesthetic, wildlife and water quality values will continue to be conserved. The Little Blakely area will be in Management Area 17, Semi-Primitive Areas and will continue to be managed to preserve its semi-primitive character. Blue Mountain and Brush Heap will remain in Management Area 17, Semi-Primitive Areas, and will continue to be managed to preserve their semi-primitive character.

Public Concern: Adequacy of Roadless Analysis

Doc#	Cmt#	Comment
337	99	"...no substantive information was provided for the roadless area analysis polygons (ONF term) unlike some other national forests. This fails to meet NEPA for open public involvement and is arbitrary and capricious."
337	101	"We do not believe that the Forest has the statutory authority to make such [1/2 mile buffer and core solitude requirement] additional restrictions to the roadless inventory and ask that the roadless inventory be redone using the FSH 1909.12 Chapter 7.1 criteria...The Forest used more restrictive criteria based on the Recreation Opportunities Spectrum that essentially combined the roadless inventory and wilderness evaluation steps."
337	102	"To exclude lands from evaluation as wilderness because of a perceived lack of solitude is not supported by law or by congressional practice..."
337	103	"There is not even a flow chart showing how numerous roadless areas were eliminated from public review."
337	104	"Forest Service needs to prepare a SEIS that has maps for each area analyzed in the roadless inventory."
337	105	"...no explanation for most of the conclusions...not consider if any additional areas should be identified as inventoried roadless areas to be covered under the Roadless Area Conservation rule. Almost every area the Forest Service looked at was determined to be not eligible for a Wilderness evaluation. This was because the Forest Service did not follow the proper procedures."
337	106	"Some roadless areas were possibly excluded due to the Forest Service not holding mineral rights for part of the lands. This was not disclosed in the DEIS and the agency should have included an alternative to acquire these mineral rights. The DEIS did not disclose how much of an area did not have mineral rights to the Forest Service that cause its elimination as roadless."
375	252	"Reanalyze roadless areas in accordance with the true intent of laws and guidance and publish maps that allow the public to provide input in this very important process."

Response

We have added information to and clarified the Roadless and Wilderness Section of the FEIS and included a new Appendix G. The plan revision roadless inventory was conducted using guidance from Forest Service Region 8 headquarters (May 19, 1995). This guidance is consistent with both the Wilderness Act and FSH 1901.12. A "1/2-mile buffer" was not used to select the roadless areas as each was identified, initially, based solely upon meeting the test of no more than 1/2 mile of road for each 1,000-acres included in each identified area.

It is important to note that FSH 1909.12, Chapter 7, Section 1, sets out the primary criteria for roadless area identification, namely that roadless areas are roadless, undeveloped areas that satisfy the definition of wilderness found in Section 2(c) of the 1964 Wilderness Act (Act). In our process to identify roadless areas we first completed the task outlined above and only then did we proceed to apply the criteria found in the Act and in Regional guidance for roadless area identification.

Lands may be excluded from wilderness qualification based upon a lack of solitude and primitive-type recreation opportunity, a practice that is well founded in law and regulation. Forest Service guidance, the Wilderness Act of 1964 (Act) and FSH 1909.12, Chapter 7 all clearly reference solitude or the conditions that are conducive to solitude as being necessary for wilderness. Solitude, a primitive recreation experience and a respite from the works of man, is the essence of wilderness. These attributes, among others, are factors to be considered in the qualification of wilderness areas [see: the Act, Sect 2 (c) (2)]; FSH 1909.12, Chapter 7.1 (ties back to the Act), 7.11 (initial roadless criteria) and 7.11(b)(4) for roadless areas east of the 100th Meridian. All of these references link directly to, as is the case of the Act, or describe components of solitude.

Wilderness requirements east of the 100th Meridian, however, have been relaxed to account for the nature of settlement patterns, larger populations, more dense settlement conditions, prior ownership and treatment of the lands that are now under roadless review as well as other pertinent factors (see FSH 1909.12, Chapter 7.11(b). Chapter 7.11(b) makes clear that all the criteria listed in that section are required for a roadless area to be qualified as wilderness. This includes 7.11(b) (4), requiring the consideration of the relationship of the area to sources of noise, air and water pollution, as well as unsightly conditions that would have an effect on the wilderness experience. Additional guidance and clarification provided by our Regional Office states that potential wilderness areas below the 2,500 acre minimum size is not absolute; however, smaller (and some larger) areas should be reviewed carefully for topography, proximity to type and use of roads, population centers and other sights and sounds of human activity to determine if solitude and primitive and unconfined recreation could be experienced (emphasis added). Should we have applied the solitude and primitive-type recreation experience rigidly, there would likely have been no areas that could have qualified due to the developed nature of the Forest and its surroundings.

Poteau Mountain West roadless area was the only area excluded from wilderness analysis consideration due to non-Federal ownership of the mineral estate. The mineral estate of this area has never been under Federal ownership, as it was retained by the seller when the Forest Service originally purchased the land. This area, located west of Poteau Mountain Wilderness is currently the site of commercially producing methane gas wells. Significant surface occupancy has already taken place. Additional investigation and drilling for methane gas is on-going and includes road and pad construction and associated disturbance to the surface. Forest specialists do not believe this area is suitable for wilderness as a result of the alterations to the existing character of the surface and in light of the potential for additional impacts due to exploration and, possibly, additional gas well installations in the future. FSH 1909.12, Chapter 7.11(a) (4) and 7.11(b) (2), (3) and (4) clearly disqualify this area due to the extent of the existing surface occupancy resulting from the previous and on-going development and occupancy that has taken place and in view of the additional work likely to take place in the future.

Minerals, Natural Gas

Public Concern: Minerals

Doc#	Cmt#	Comment
290	76	"...since the completion during 2004 of the updated reasonably foreseeable development review, there has been a continuing increase in the demand for tracts in the Arkansas portion of the Ouachita National Forest in competitive oil and gas lease sales by BLM's Eastern States Office...increased leasing activity is likely to lead to increased drilling and, potentially, increased production of natural gas from lands in the Ouachita National Forest."
290	77	"...Plan that is finally adopted should accommodate and support the increased interest that now exists in the Forest's natural gas resources."
365	220	"SEECO fully supports the development of the LRMP under Alternative 'B' or any approved alternative which includes: the concepts of multiple-use; continues to identify land available for oil and gas leasing; insures and respects the exercise of private mineral rights to explore and develop mineral resources."
365	221	"SEECO regards this estimate [BLM] of drilling and production activity for the RFDS as low... The recent leasing activity by both SEECO and other lessees is indicative of increased activity in many of these areas during the upcoming planning period that the drafters are not fully recognizing. The LRMP must recognize the total active oil and gas leases in the ONF, taking into consideration the results of competitive sales during 2004 and 2005, in order to insure an effective planning document."
365	222	"...drafters have under stated the potential of ONF lands for natural gas... This potential for increased activity needs to be considered for revision of the 'Medium' and 'High' cases for the RFDS and the cumulative impacts fully incorporated into the planning document."
365	223	"If there is a multi-fold increase in anticipated drilling activity, the need and potential impacts of additional roads is under estimated in the RFDS... This extension [previously unexplored areas] will necessitate new road construction where only limited access and unimproved logging access roads may currently exist."
365	224	"Similarly, the RFDS under estimates pipeline activity that would follow from unanticipated drilling activity... The RFDS also fails to anticipate production facilities – principally compression and treatment facilities – that will accompany the pipelines. Such facilities may require siting separate from drilling and production pads and will include compression facilities requiring continuous functioning equipment."
365	225	"The drilling scenario should include the likely utilization of horizontal drilling technology, multiple-well drilling pads and increased well densities for both conventional and unconventional reservoirs...size of the drilling pads could increase from the 2 acres projected in the RFDS to 4 or more acres."

365 226 "It is important that the LRM correctly reflect anticipated exploration and production activity. If the draft plan under estimates the level of mineral activity, the result will be less funding for the necessary personnel to conduct the required processing of APD's and development plans associated with such activity."

Response

The Revised Forest Plan includes the concepts of multiple uses; identifies land available for oil and gas leasing; and allows for exploration and development of mineral resources. The plan does not preclude increased natural gas exploration and extraction. The Forest Service relies upon the expertise of the Bureau of Land Management (BLM) for preparation of the Reasonably Foreseeable Development Scenario (RFDS). We have notified BLM of these concerns and concur with them that no adjustments to the RFDS are necessary at this time.

Interest in leasing may or may not be the result of real evidence for minerals. The Ouachita NF has experienced higher rates of leasing in the past and no discoveries were made. Leasing activity, by itself, does not affect the nature of planning decisions. There simply are too many reasons other than the presence of minerals that causes public interest in securing interest in the mineral estate for a period of time using the leasing process. Based on input from the BLM, The Forest has accessed the best available scientific data for this planning period, and if major changes occur at a future time, required re-evaluations will be addressed as amendments to the Plan. Funding to process APDs is not based on "what if" projections. The agency will appropriately respond if and when conditions change.

The Forest Service primarily is concerned with surface impacts. Drilling technology is expected to actually decrease the potential for surface impact in those cases where multiple wells can be drilled from one pad site location.

Public Concern: Importance of Natural Gas Potential

Doc#	Cmt#	Comment
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290	75	"...in the summary of Forest roles and contributions in Part 1 of the proposed Revised Plan, natural gas potential is not even mentioned."
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Response

The natural gas potential of the Ouachita NF is modest and did not merit mention in terms of national, regional, or local significance.

Forest Composition and Structure, General Wildlife Habitat, Biodiversity

Public and Agency Concern: Hardwood Management and Forest Type Conversion

Doc#	Cmt#	Comment
92	44	"The revised plan does not go far enough in detailing plans for oak dominated forest management. Management prescriptions which include commercial and non-commercial thinning of over stocked oak dominated forest types must be discussed...."
292	84	"In addressing oak decline, we believe that the first principle should be recognition that the absence of fire and the resulting excessive density has contributed to the current unhealthy forest condition."
337	141	"The FS also claims that much of the Ouachitas was a pine-bluestem ecosystem. This falsification of forest health and ecosystem composition results in alternatives heavily biased to logging and burning. ...heavy conversion to pine and pine-bluestem...The Forest Service does not have any credible information to support its heavy conversion to pine and pine-bluestem...Statistics show the Ouachita to be hardwood dominated."
337	146	"The Forest Service claims that it has north slope hardwood areas not suitable for logging so it claims that hardwood types and hardwood needs are met. However, this mentality restricts the habitat of species dependent upon hardwoods, den trees, and hard mast."
374	241	"The Commission strongly recommends more detailed, silvicultural strategies to provide historic oak woodland conditions throughout the range. The revised plan does not go far enough in detailing plans for oak-dominated forests."

Response

With the exception of some prescribed burning and occasional wildlife stand improvement actions, the oak dominated forests and woodlands of the Ouachita NF have been treated for decades with what amounts to hands-off management. Rather than project that the Ouachita NF will suddenly shift to an aggressive program of thinning and regeneration harvests in oak stands, The Forest has chosen an adaptive management approach, one that allows forest managers and research partners to begin testing the application of more management tools in hardwoods but does not mandate their widespread use. Plan standards (see thinning guides, for example) provide sufficient flexibility to increase active management in oak systems. The desired conditions for oak-dominated communities (Part 1 of the Plan) include the restoration and maintenance of appropriate fire regimes.

No claim that "much of the Ouachitas was a pine-bluestem ecosystem" was made in the EIS or Plan. The EIS provides evidence (Chapter 3, Terrestrial Communities section) that the pine-bluestem ecosystem provides conditions needed for the conservation of habitat for many species, including at least one federally listed species and several Sensitive ones. Of the nearly 1.8 million acres that make up the Ouachita NF, approximately 350,000 acres (19.4% of the national forest, and including old growth pine-bluestem woodland) will be managed toward pine-bluestem ecosystem conditions. By working toward a desired condition of 350,000 acres of pine-bluestem woodland, the Forest Service will reduce the need for additional listings of threatened or endangered species.

Forest-wide (and some management area specific) standards for retention of den trees and mast-producing trees at the landscape and stand scales were included in the proposed and final versions of the revised forest plan. Standards for retention and regeneration of hardwoods in pine and pine-hardwood stands are also presented in both versions.

Finally, restoration of oak woodlands is an explicit part of the ecosystem restoration strategy within Management Areas 21 and 22.

Public Concern: Inclusions of Hardwood Stands in Pine Old Growth Areas

Doc#	Cmt#	Comment
54	13	"north slope of Kiamichi Mtn., which currently supports Mesic Hardwood and Mesic-Dry Oak forest cover is being proposed to be allocated to MA-21 (Old Growth Pine-Bluestem), an MA that emphasizes an ecosystem type that did not historically occur on north facing slopes and for which the management prescription for is totally inconsistent with maintaining the current (and historical) forest cover for this area"

Response

As noted in the description of MA 21 in Part 2 of the Plan, "Hardwood stands and inclusions will be unsuitable for timber production and will be managed to restore upland hardwood and oak-pine old growth. Fire will not be excluded from these areas, although burns will generally be less intense [due to their higher moisture content, in part] and less frequent." No existing hardwood stands in MA 21 will be converted to pine-dominated stands. Standard 6.01 was clarified to read: "Where mesic hardwood stands are included in large burning blocks or anywhere within Management Area 21, use techniques that either avoid or result in low-intensity fires within these communities. Direct firing techniques are not encouraged in these communities, unless needed to secure wildfire control lines."

Public Concern: Development of Old Growth

Doc#	Cmt#	Comment
145	58	"allowing a substantial portion of forest to develop as old growth, to encourage species diversity."
337	172	"All old growth opportunities should be evaluated independently of potential timber stands. Opportunities must be based on both landscape and structural characteristics...Riparian areas deserve priority for inclusion in old growth designations for watershed protection and wildlife benefits."

Response

A substantial portion of the forest will be allowed to develop old growth character and other portions will be actively managed to restore old growth characteristics under the 2005 Revised Forest Plan. Management direction for old growth is clarified throughout the Revised Plan, including a "priority statement" in Part 2, an objective concerning old growth inventory (also in Part 2), a new appendix that provides data concerning potential future old growth by management area and ecosystem type, and refinement of some of the standards for MA 21 (Pine Old Growth Restoration).

Public Concern: Early Successional Habitat

Doc#	Cmt#	Comment
337	142	"The Forest Service should only seek to restore early successional habitat on lands cleared in the recent (0-15 years) past, and abstain completely from logging mature forests to re-create early successional habitat...The DEIS should propose an alternative to keep logging and openings on the well distributed even age plantations of the last forty (40) years."
337	173	"The Forest Service always claims that early successional species require the ...timber sales... [no] proof nor evidence of this claimed need or addresses the impacts to the species currently living in the area."

Response

The Species Viability Evaluation considered the habitat needs of *all* native species, and the Forest Plan is designed to sustain habitat for those species. It is not possible for every acre or every forest stand to sustain all needed habitats. What the Forest Plan presents is a landscape level approach to sustaining viable habitat for all native plants and animals that regularly inhabit or use the Forest. Early seral habitat is important to the viability of the following species: Bachman's Sparrow, American Kestrel, Northern Bobwhite, Red-headed Woodpecker, Orchard Oriole, Painted Bunting, Bewick's Wren, Prairie Warbler, White-eyed Vireo, Diana Fritillary, A Twistflower, Western Diamondback Rattlesnake, Timber Rattlesnake, Great Plains Skink and Southern Prairie Skink. This habitat is found where herbaceous elements dominate previously disturbed areas such as recently-harvested forests, old fields, and wildfire/wind/ice-damaged areas. Timber sales represent one tool that can be used very effectively to generate early seral habitat. This condition may persist for up to 10 years or indefinitely if stand conditions remain relatively open.

Under the 1982 NFMA planning regulations, the Forest Service is required to "assure that all even-aged stands scheduled to be harvested during the planning period will generally have reached the culmination of mean annual increment [CMAI] of growth." For shortleaf pine in the Ouachitas, CMAI is not achieved until 60-70 years of age. Therefore, the suggestion that the Forest Service should restore early successional habitat only on lands "cleared in the recent (0-15 years)," virtually all of which have been reforested, is not only impractical but would be counter to the 36 CFR 219 regulations under which this forest plan revision was completed; as such, the Forest Service cannot implement shelterwood, seedtree, or clearcut harvests (the primary means used to obtain early successional habitat) in young stands.

Public Concern: Wildlife Openings

Doc#	Cmt#	Comment
85	36	"We believe that four well distributed 1-5 acre opening per square mile should be the goal of the forests regardless of glades, sufficient woodland condition, or non-fescue openings on private land."
367	227	"...four well distributed 1-5 acre openings per square mile should be the goal of the forests regardless of glades, sufficient woodland condition, or non-fescue opening on private land."
374	243a	"The Commission strongly supports the continued emphasis on providing supplemental wildlife planting for game management throughout the forest. Although the planned vegetative management will result in increases in native herbaceous plants and early successional habitat, the requirement of late winter foraging resources these wildlife openings provide game species is crucial in maintaining population levels of several species of wildlife having important social and economical value in local communities."

Response

The Forest will continue cooperative efforts with state wildlife management agencies to enhance winter foraging opportunities. The Planning Team determined that standard WF008 ("Where open area habitats are not provided by other conditions, develop one permanent wildlife opening, one to five acres per 160 acres of habitat") was sufficient to address needs for supplemental wildlife openings.

Agency Concern: Wildlife Habitat and Roads

Doc#	Cmt#	Comment
374	243b	"We...recommend additional roadless areas be provided during hunting seasons through the use of seasonal closures of selected roads. These areas will enhance the quality of recreational opportunities while reducing the concentration of hunters."
367	229	"we would like to see the forests consider reducing the open road density where it exceeds one mile/section and continue to provide for reasonable access for hunting, fishing and other forms of recreation."

Response

Eliminating unneeded roads is a priority (see Transportation System in Part 2 of the Plan, which also includes three related objectives). Opportunities to reduce road density will be analyzed at the project level using Transportation Design Criteria TR005 and TR006. Wildlife agency recommendations for seasonal road closures in specific areas will be considered on a case by case basis.

Public Concern: The Importance of Dead and Decaying Woody Material

Doc#	Cmt#	Comment
337	122	"The DEIS also fails to cite monitoring results showing the FS has been able to correctly implement coarse woody debris guidelines on the ONF...An environmental impact statement must present a 'reasonable complete discussion of possible mitigation measures.' ..The Ouachita fails to meet this test."
337	181	"Forest Service research indicates dead and decaying wood accounts for about 25% of a forest's biodiversity. The impacts of removing trees on this component of the forest ecosystem need to be considered."

Response

The availability of coarse woody debris on the forest floor and in streams was not an issue during this forest plan revision and therefore was not examined in detail in the EIS. Management direction for dead and decaying woody material includes the following Design Criteria:

WF005 Where timber is harvested, retain or create at least two snags per acre, minimum 12-inch diameter at breast height (dbh) with an objective of 16-inch dbh or larger. Where naturally occurring snags of this size are unavailable or cannot be created, retain or create snags near the required size. Standing snags will not be felled, unless necessary for insect or disease control or to provide for safety.

WF007 Where available, retain 50 linear feet of pine logs (12-inch diameter or greater) and 50 linear feet of hardwood logs (12-inch or diameter greater) per acre as wood debris on the forest floor within harvest areas. Felled logs will be oriented along contours.

Agency Concern: Restoration of Stands of Native River Cane

92	42	"Restoration of native cane stands on appropriate sites also should be planned and emphasized where ecologically appropriate."
292	82a	"Restoration of stands of native cane on appropriate sites also should be planned and emphasized where ecologically appropriate."

Response

Riparian-dependant native cane stands may be restored within streamside management areas (MA 9) where ecologically appropriate. Site-specific project-level analyses are the best tools for assessing cane restoration opportunities.

Public Concern: Herbaceous Understory

337	168	"...impacts to herbaceous understory needs to be addressed. Research indicates herbaceous-understories never recover from logging."
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Response

This concern was not raised as an issue during scoping and was not treated as a significant issue. There is a substantial body of evidence cited in the FEIS that demonstrates that, in the Ouachita Mountains, the response of herbaceous understories to logging and burning is generally an increase in diversity and a profusion of growth. The research alluded to (but not documented) in comment 168 may have been in mesic hardwood forests, where the response of herbaceous understories is quite different.

Public Concern: Inventory and Protection of Rare ("Unique") Plant Communities

Public Concern: Rare Upland Communities

Doc#	Cmt#	Comment
54	11	"Only 34, 430 acres have been identified and allotted to MA 6 (Rare Upland Communities)."
54	14	"...accurate inventory of rare upland communities...is necessary in order to allocate the appropriate acreage."
337	185	"The analysis needs to identify and the Forest Service needs to protect all unique plant communities."

Response

Areas known to contain rare upland plant communities are assigned to Management Area 6. Any additional rare upland plant communities located during subsequent inventories will be allocated to Management Area 6. To clarify this intent, Objective 12 was added to Part 2 of the Plan. Management Area 6 (Rare Upland Communities, including Mesic Hardwood Forest, Montane Oak Forest, Dry Oak Woodlands, Novaculite Glade and Woodland, Acidic Cliff and Talus, Dry Acidic Glade and Barrens, Calcareous Prairie) is specifically designed to conserve rare upland communities.

Public Concern: Biodiversity and Species Viability Evaluation

Doc#	Cmt#	Comment
57	22	"a diversity index is used to analyze economic issues, while no such index is applied to forest biodiversity."
57	25	"...an analysis of burning on biodiversity should be included."
165	65	"Scientific References:...conclusions on the impacts of their management activities on PETS species, historic ecosystem composition, historic fire return intervals, or the probably results of the prescribed burning program are not sufficiently supported by proven science to be utilized in the DEIS."

337	144	"The Forest Service absolutely must include strong species viability standards and mandatory monitoring requirements for population counts...In conjunction with this should be a comprehensive analysis of what size of forest patches will remain after implementation of the plan, and what species are currently occupying these areas."
337	183	"The analysis needs to address the status of native fisheries and mussels and stream habitat quality compared with historic conditions in areas to be logged, Forest and region-wide. The analysis needs to disclose the population trends of exotic or introduces species relative to native fisheries and mussels in areas to be logged. The impacts logging will have on these populations needs to be addressed."
337	167	"...protect neotropical migrants and biodiversity in general. The longer the Forest Service waits, the worse the problem becomes. Biodiversity and forest fragmentation must be addressed in regard to all species, not just birds. The degree to which this area provides a biological corridor and its value should be considered."
337	169	"Analysis needs to be conducted and presented to show the range of potential impacts for the following variables: total amount and distribution of late-successional and mature forest habitat; total amount and distribution of important wildlife habitats now uncommon due to past human activity (e.g., riparian forests, native grasslands, etc.); total amount and percentage of forest habitat compromised by edge effects; size distribution and habitat patches by seral stage and forest type; forest patch perimeter to edge ratios; amount and distribution of roadless area within and adjacent to the planning area; degree of connectivity between both individual forest stands and larger habitat blocks; degree of structural contrast between habitat patches; population viability analysis for species or feeding guilds most prone to fragmentation effects (e.g., area sensitive mammals, forest-dwelling songbirds)...The analysis must consider the functional, structural, and compositional attributes of biodiversity. The analysis needs to evaluate the existing condition of biodiversity, and compare it with the natural range of variability."
337	170	"To adequately consider the impacts of the project on biodiversity at the landscape scale, the following analysis must be conducted for all of the alternatives: size distribution of habitat patches for all community types and forest seral stages; patch size diversity index; degree of connectivity maintained between habitat patches at various scales, particularly between those patches that are now uncommon in the landscape (e.g., late successional forest, roadless areas); vegetation mosaic patterns; cumulative effects at scale of watershed and regional ecosystem; comparison of landscape patterns created by development to those created by natural disturbance regimes for all the above variables; maintenance of uncommon or unique landscape elements (e.g. rare plant communities, natural ecotones, undistributed vegetation along environmental gradients, et.)"
337	171	"The analysis needs to consider the cumulative and site specific effects of logging on biodiversity. The analysis must consider impacts on the following levels of diversity: 1) regional landscape, 2) community-ecosystem, 3) population-species, and 4) genetic. The analysis area must be large enough to consider biodiversity on all these levels."

375 257 "The Forest Service absolutely must include strong species viability standards and mandatory monitoring requirements for population counts in this Forest Plan. Only by maintaining viability can the agency avoid having to consider the impacts of having species become listed as threatened or endangered. In conjunction with this should be a comprehensive analysis of what size of forest patches will remain after implementation of the plan, and what species are currently occupying these areas. Also, the list of monitored species needs to include frogs, bats, snakes, salamanders, and perhaps other groups of species that occur on the forest."

Response

The FEIS documents that the planning team thoroughly analyzed all ecological systems identified by NatureServe for the Ouachita Mountains and West Gulf Coastal Plain associated with the Ouachita NF. The team analyzed the ecological consequences of the various alternatives for these terrestrial and aquatic systems by comparing existing conditions (including key factors such as ratios of early, mid and late successional habitat, remoteness/road density, fire frequency and season) to desired conditions according to needs of the associated 145 terrestrial and aquatic plant and animal "species of viability concern" as determined by the most current science and the expert opinions of knowledgeable biologists and ecologists. The team drew upon data and expertise from the natural heritage inventory programs in Arkansas and Oklahoma, The Nature Conservancy, the Arkansas Game and Fish Commission, the Oklahoma Dept. of Wildlife Conservation, and other experienced biologists and ecologists and reviewed nearly 800 publications. The Species Viability Evaluation (SVE) conducted for this planning effort identified and considered each species of viability concern rangewide, within the Interior Highlands, and at the National Forest level. The habitat needs of all other native plants and animals were considered to be satisfied by achievement of the desired conditions identified in the Plan and FEIS for ecological systems and habitat elements. All alternatives were designed to conserve viable populations of all native species that live within or complete an important part of their life cycle on the Forest.

Public Concern: Interior Forest Habitat

Doc#	Cmt#	Comment
337	143	"There needs to be clear criteria in the plan for identifying areas that would be available for interior forest habitat restoration, and clear and enforceable standards and guidelines for implementing such restoration."
375	253	"Include at least one alternative that includes blocks of 300,000 acres minimum as interior forest habitat restoration."
375	254	"The forest is already fragmented severely, which is having a serious impact on the ecology of the forest. Openings should be limited to large openlands and to those lands that have natural openland communities and are not being significantly encroached by forest succession."

Response

Although "interior forest habitat" was not identified as a significant issue, the SVE addressed the needs of species associated with interior forest habitat such as the Cerulean Warbler. "Interior forest habitat" was not a significant issue because normal forest management practices have not been shown to be important fragmenting influences (the major documented fragmenting influences on forests and woodlands are conversion to farms, pastures, industrial sites, and suburbs and construction of new highways), and therefore, there was no need to develop special criteria or alternatives to address interior habitat. Nonetheless, the EIS discusses the current and desired conditions and the associated biodiversity of all ecological systems of the Ouachita Mountains and West Gulf Coastal Plain identified by NatureServe that occur within the Ouachita NF.

Public Concern: Tree Species Diversity

Doc#	Cmt#	Comment
337	151	"Tree species diversity needs to be tracked on a stand-by-stand basis, not solely on a forest-wide basis. It is foolish to think that you can address tree species diversity ONLY on a forest-wide scale-without site-specific data."

Response

The Ouachita NF uses standardized stand sampling procedures to collect data for entry into the vegetation database. Trees within sampled plots are identified by species and various other attributes. The collected data provide sufficient information to depict species composition and forest structure on a stand-by-stand basis.

Agency Concern: Desired Condition of Pine-Bluestem Community

Doc#	Cmt#	Comment
357	205	"...we believe that many of the details specified for MA 21 (pg 42) could and should apply to MA 22 (pg 44) also. The desired condition stated for stands within MA 22 is 60 to 120 square feet of basal area per acre. At the upper end of this range, these stands would be too dense for optimum Red-cockaded Woodpecker habitat and for significant pine reproduction. We feel the range, indicated for MA 21 (30 to 80 square feet basal area per acre) would produce better Red-cockaded Woodpecker habitat and more effectively secure pine regeneration."

Response

The Forest agrees that 120 sq. ft. of basal area is too dense for optimum RCW habitat. However, the only stands in this MA that will have basal areas as low as 30 sq. ft. will be those in a shelterwood regeneration condition. Compared to the conditions that will prevail in this MA, shelterwood stands will be a relatively uncommon landscape feature. The desired conditions in terms of tree basal area over most of MA 22 range from 60 sq. ft. to 80 sq. ft. The Revised Forest Plan text has been changed to reflect these desired conditions.

Doc#	Cmt#	Comment
357	206	"...disturbance regime for MA 21 is provided in the Management Plan: 'These forests will be maintained by frequent, moderately intense ground fires, some of which will occur in the summer and fall (July- November). Fire return intervals will range from one to more than four years, but will occur on an irregular basis at varying times, seasons, and intensities. Fires will be frequent enough, and hot enough to suppress the woody understory, and to occasionally kill individual overstory trees or small groups of trees.' We believe that this description is applicable also to MA 22, for which there are very few details provided regarding how fire will be applied."
357	207	"The <u>Regeneration</u> section for MA 21 specifies that 'The periodic use of prescribed fire under open canopies may promote natural regeneration at irregular intervals, resulting in "banked" advanced reproduction in many core and replacement stands...' At least part of this description should be adapted and applied to the regeneration strategy for MA 22."

Response

We agree and have added similar language to the description for MA 22

Protection of Watersheds and Riparian Areas

Public and Agency Concern: Protection of Watersheds and Drinking Water Quality

Doc#	Cmt#	Comment
60	27	"...sediment and nutrient load in Lake Ouachita. Volume data is not included in the DEIS or revised Plan."
60	28	"...data needs to be gathered...1: How many acres of logging and by what cutting methods will it occur annually? 2) What will be annual volume of road construction of all types? 3) How many acres of burning will occur annually?"
143	56	"...implementation of BMPs designed specifically for the protection of drinking water quality; increased buffer management zones; zones of exclusion; working with stake holders to best determine the appropriate protection measures; additional and/or increased monitoring activities."
145	60	"Watershed setbacks must be substantial to preserve the health of the watershed, to prevent erosion, and to preserve recreational uses."
259	72	"Design criteria that state the maximum percentage of a particular watershed that can undergo harvest at any particular time should be considered."

337	127	"The failure of the FS to monitor watershed conditions and fish population trends (over time) and required by the Forest Plan and by NFMA means the assumptions built into the DEIS cannot be taken as valid or reliable. The DEIS fish survey data used in the risk determinations ignored the most important information. (The 1970's ADEQ survey of aquatic species.)"
337	129	"There are thousands of acres of private timber lands in close proximity and their impacts will be cumulative on wildlife habitat, soils and streams and they must be considered together under NEPA...Analysis of specific timber sales located near each other and a comprehensive evaluation of the environmental effects of these sales when added together must be performed in an EIS...To protect and restore water resources, and to manage the public lands for the greatest good of the public, the Forest Plan should identify and following objectives: maintain fully forested conditions within its boundaries; stop building roads; dis-allow expansion of mining activities; discontinue herbicide use; management plans should reflect watershed preservation values."
337	130	"It did not diffuse 'ongoing urbanization' that is impacting the Ouachita, with a variety of private and public entities creating the cumulative impact. Rather, a series of timber sale projects (all of them planned and carried out by the Forest Service) are being implemented, creating biological impacts to Ouachita watersheds."
337	136	"The Forest Service has not regularly conducted such monitoring or evaluation, and has not obtained accurate scientific monitoring data or written evaluations, specifically, with regard to the assessment of impact in the DEIS. The DEIS analysis is based on Forest Service opinions conjecture, and very limited aquatic survey data."

Response

The amount of detail requested in comments 27 and 28 for a specific part of the Forest is outside the scope of this Forest-wide analysis. Estimates for Forest-wide activities are provided in the EIS for items 1 and 3 in comment 28. Item 2 cannot be accurately determined until site-specific analysis is conducted during Forest Plan implementation. An annual program of work is produced that shows scheduled timber sales, road construction, and planned areas of prescribed burning.

At the project (Forest Plan implementation) level, all watershed disturbing actions are designed, and mitigation measures specified, so as not to exceed the maximum allowable soil loss for that harvest unit. This ensures that soil productivity will be maintained on each harvest unit. To ensure that the watershed remains in good condition a cumulative watershed impacts analysis is performed. Rather than using a model based on some arbitrary percentage of a watershed area impacted, the Ouachita Forest uses the IMPACTS model, which assesses cumulative watershed impacts of proposed management activities and activities on private, state, and other federal lands.

The watershed cumulative effects analysis for water quality and associated beneficial uses included activities and/or land uses on the private lands within each watershed assessment—see the Water Quality section in the FEIS. Sediment values were listed for 5th level watershed around Lake Ouachita and Forest-wide. The Revised Forest Plan adds clarification concerning best management practices for protection of public source areas and watersheds. Annual Monitoring and Evaluation Reports, available at <http://www.fs.fed.us/r8/ouachita/projects/>, summarize the results of periodic watershed and fish population monitoring

The most recent publication by ADEQ concerning aquatic species (Arkansas Department of Pollution Control and Ecology. 1987. Physical, Chemical, and Biological Characteristics of Least-Disturbed Reference Streams in Arkansas' Ecoregions, ADPCE, Little Rock, AR) was reviewed and used in the risk determinations for aquatic species as part of the analysis for the EIS.

Public Concern: Watershed Preservation as an Issue or Sub-issue

Doc#	Cmt#	Comment
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60	29	"...watershed preservation, should be added as a category to the Ecosystem Health and Sustainability Category."
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Response

The Forest agrees that watershed health is vitally important and that it is part of Ecosystem Health and Sustainability. However, significant issues were defined during scoping, and initial conclusions about what constituted significant issues for plan revision were shared through the Notice of Intent to prepare an EIS, through newsletters, and in several series of public meetings; this suggestion never came up. Although Watershed Health is not listed specifically as a sub-issue, it nonetheless was a high priority that the interdisciplinary team addressed. Rather than add Watershed Health as a sub-issue, the focus was on refining standards designed to protect soil and water quality (watershed health). See Forest-wide design criteria for soil and water, vegetation management, and transportation and Management Area 9.

Agency Concern: SMZ Width and Layout

Doc#	Cmt#	Comment
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374	239	"...Commission offers ... SMZ recommendations."
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378	264	"...protective "zone" of variable distances but at least 100 feet from both edges of perennial streams and the shores of lakes or ponds greater than 0.5 acre and 30 feet from both edges of other streams with defined channels. We urge you to stand by the same decision for land surrounding public water supplies as pressure for future development in their watersheds can and will threaten water supplies."
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Response

SMA recommendations by slope are shown in the Plan and are the same or greater than those recommended. The proposed Revised Plan includes protective standards for public water supplies.

Public or Agency Concern: Concept of "Limited Cutting" in SMAs

Doc#	Cmt#	Comment
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357	212	"The plan states that streamside management areas are, depending on their location, between 100 and 30-feet in width. Limited cutting will be allowed in these areas; however, the concept of limited cutting is vague and should be defined more explicitly such that conservative land management practices in these sensitive areas are maintained."
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Response

The proposed and final revised plans clearly indicate that 100 feet either side of a perennial stream and 30 feet either side of other defined channels (non-perennial streams) are the *minimum* widths for streamside management areas (SMAs). Clarification concerning valid rationales for tree cutting in SMAs has been added to the final revised plan (see Management Area 9 direction).

Public Concern: Groundwater and Springs		
Doc#	Cmt#	Comment
337	179	"The DEIS did not assess the impacts of planned activities upon groundwater and springs."
Response		
Springs are protected as part of Management Area 9. Groundwater effects were not identified as a significant issue but were discussed in Report 3 of the Ozark-Ouachita Highlands Assessment (1999), which informed this plan revision.		
Agency Concern: Stream Crossings		
Doc#	Cmt#	Comment
357	211	"Greater priority should be placed on reducing the impact of road crossings on stream morphology and fish passage."
Response		
The Ouachita NF is at the forefront of research on the impacts of fish passage at road crossings in warmwater stream environments and continues to adjust crossing designs and test them for improving fish passage. We also work closely with partners studied stream morphology changes. The proposed Revised Forest Plan includes an objective to improve aquatic organism passage on an average of no fewer than six stream crossings per year and a Forest-wide standard requiring that all new stream crossings be constructed so that aquatic organism passage is not impeded.		
Public Concern: Firelines in SMAs		
Doc#	Cmt#	Comment
259	68	"An alternative for bladed firelines that cross streams in streamside management areas should be considered... We suggest no blading within 30 feet of any stream channel."
Response		
This alternative approach was considered but was not included in any plan alternative. However, the 2005 Revised Forest Plan includes the option to use firelines constructed with hand tools where feasible.		
Public and Agency Concern: Extra SMA Protection for Aquatic T&E Species		
Doc#	Cmt#	Comment
42	8	"...rare endemic crayfish, <i>Orconectes saxatilis</i> , is known only from the headwater of the Kiamichi River and its upstream tributaries...such non-permanent reaches would be afforded inadequate protection."
42	9	"...although the species [<i>Orconectes saxatilis</i>] is found in a low risk watershed, the actual risk under any of the management plans is higher than "low".

259 69 "T& E species (i.e., several mussel species and the leopard darters)...non-perennial portions of these stream be afforded the same protection as the perennial portions...minimum buffer zone of 100 feet...recommend buffers of 100 feet, 125 feet, and 150 feet on all channels (perennial and otherwise) with slopes of 0-15%, 15-35%, and >35%, respectively, for streams that harbor T&E species or other species of concern."

Response

Management Area 9 (Water and Riparian Communities) includes stringent standards for protection of the riparian zones and streams in which these species occur. Additional protection is provided for most leopard darter habitat by virtue of its inclusion in MA 20 (Wild and Scenic River Corridors). We have called attention to the potential need for additional conservation measures for aquatic species by adding the following standard to the 2005 Revised Forest Plan:

TE003 As part of project planning within sixth level watersheds where aquatic Proposed, Endangered, Threatened, Sensitive (PETS) species occur or are anticipated to occur downstream from proposed ground-disturbing management activities, consider additional measures (e.g., wider Streamside Management Areas) to conserve habitat for these species.

Agency Concern: Decommissioning Roads to Protect Riparian Areas

Doc#	Cmt#	Comment
374	237	"...high priority [should] be placed upon decommissioning un-needed roads and trails, especially within riparian ecosystems...The manner by which roads are decommissioned is unclear and requires more details to what methods, (rehabilitate, obliterated) will be employed."
292	82b	"We recommend that the Forest place a high priority on identifying unneeded roads within riparian areas. Decommissioning and closure of unneeded roads adjacent to streams will address multiple aquatic and riparian health issues."

Response

Decommissioning unneeded roads is a priority under the proposed Revised Forest Plan. Under Watershed Function, there is a priority to, "Identify roads and trails that should be reconstructed or decommissioned to reduce sediment and improve watershed condition." An additional priority was added to Part 2 of the Plan that states, "When conducting roads analyses, place special emphasis on reducing the impacts of roads in Streamside Management Areas (by proposing roads closures, road reconstruction, or other means)." Through project level roads analyses, unneeded roads or those contributing excess sediment to streams and/or SMAs are identified and recommended for improved maintenance, reconstruction or decommissioning to correct erosion problems. Two objectives in the Plan also address road decommissioning: OBJ37–By 2015, identify all system roads that should be obliterated. Performance Indicator: miles of system roads decommissioned. OBJ38–Obliterate 25 percent of roads identified under the previous objective by 2015 (many such needs to obliterate roads will be identified well before 2015). Performance Indicator: miles of road obliterated by 2015.

Cumulative Effects

Public Concern: Adequacy of Cumulative Effects Analysis

Doc#	Cmt#	Comment
337	116	"The DEIS fails to link the current and cumulative soil disturbance across thousands of acres in the cumulative effects area watersheds to the impact on water quantity, Quality and downstream erosion."
337	128	"The DEIS fails to adequately address the cumulative impacts 'which result from the incremental impact of the action (timber sales, burning and road construction of the Draft LRM) when added to the already heavily impacted condition of the Ouachita watershed."
337	131	"The Forest Service has made the same error here, by failing to disclose cumulative impacts of the Draft Plan activities on the environment."
337	132	"The Ouachita uses the arbitrary 115% sediment increase as its threshold on site specific projects! The National Marine Fisheries Service (NFMS) criticizes the use of Best Management Practices (BMPs) and mitigation as poor surrogates for addressing cumulative watershed effects because BMPs are addressed to individual actions and fail to do limit the totality of individual actions within a watershed."
337	133	"The DEIS utterly fails to adopt these scientific [Besechta et al. (1995)] recommendations regarding cumulative effects analysis."
337	134	"The DEIS under cumulative impacts on water quality refers to a process ...for predicting sediment yields for analyzing cumulative effects of proposed management action on water quality specifically for the Plan level...not been peer reviewed...just describe[s] the process for predicting Plan level sediment increases but uses values from the Ozark highlands. It displays examples of sediment increases in table form...'sediment values are expressed as a percent increase over the baseline'... This table [3.8] does not include predicted sediment increases for plan activities by Draft Plan alternative."
337	135	"...supposed risk levels for watersheds is based on very limited data and did not use historical survey data that covers a longer period...more appropriate for cumulative impacts analysis...risk levels in Table 3.8 are based only on current sediment levels. Thus the DEIS fails to analyze impacts of Draft Plan actions."

337	176	<p>"The issue of the impacts to soil and water quality needs to be addressed. The effects of soil compaction and vegetation/nutrient removal must be considered. The analysis needs to address the impacts of decreased water quality due to increasing rates of soil erosion and mass wasting events. The effects of sedimentation, nutrient removal, and increased temperatures resulting from logging must be considered. The analysis needs to address the <i>cumulative impacts on aquatic communities, including fisheries...cumulative threats to water quality</i>, including logging, illegal dumping, oil and gas leasing, wildlife openings upstream of areas to be cut down must be addressed. The analysis needs to identify all these threats. The analysis needs to identify and protect all riparian areas, wetlands, and floodplains."</p>
356	191	<p>"The preferred alternative also completely lacks cumulative air and water quality assessments, especially concerning effects of large-scale fires on human health...effects of smoke and particulate matter harming the many thousands of persons in Arkansas and surrounding states who suffer from asthma, emphysema, chronic bronchitis and COPD medical health conditions. We strongly request that total program impact to human health by prescribed fires under this alternative be assessed, including coordination with other agencies conducting prescribed fires in the region."</p>
356	197	<p>"Increased logging would result in more road construction and erosion, which has and continues to be a concern."</p>
356	198	<p>"...we're also concerned about the lack of assessment of cumulative water quality effects resulting from combined timber harvest and other management activities."</p>

Response

The FEIS species viability evaluation and cumulative watershed analysis address all of these concerns. The ongoing Basin Area Steam Surveys have not detected changes in aquatic populations over time in response to different intensities of vegetation treatment/logging. Moreover, MA 9 standards were developed to minimize potentially detrimental effects from watershed activities to aquatic systems, with monitoring protocols designed to detect changes in water quality and aquatic community health. These impacts are evaluated as projected sediment increases, and a risk rating is determined for aquatic biota.

The cumulative effects model has been peer reviewed. The effects/consequences chapter of the FEIS provides the analysis of each watershed for each alternative for the first 10-year period.

The cumulative effects analysis did not use the 115% threshold; instead, the Forest calculated a risk level for each watershed, as reported in the FEIS and further described in a process paper within the administrative record.

Public Concern: Effectiveness Monitoring Data

Doc#	Cmt#	Comment
337	114	<p>"Without a detailed analysis of soil and watershed impacts informed by past effectiveness monitoring data, the Forest Service simply cannot insure that soil and watershed conditions in the forest will not be significantly and permanently impaired."</p>

Response

The Forest continually analyzes soil and watershed impacts through effectiveness monitoring to ensure that long-term soil productivity and watershed conditions are not impaired. Effectiveness monitoring includes on-site project activity, monitoring by watershed specialists, timber sale administrators and other Forest Service representatives, and through Implementation Monitoring Reviews. The results of these actions are documented and actions taken where problems or improvements are needed to correct deficiencies. Examples of analyses used at the project level to ensure soil and watershed conditions will not be impaired include the use of the Modified Universal Soil Loss Equation and IMPACTS models in all watersheds. Results of these monitoring efforts were fully incorporated in the FEIS analysis.

Public Concern: Peak Stream Flows

Doc#	Cmt#	Comment
337	123	"The water quality analysis ignores the occurrence of high peak flows. (See Clingenpeel and Leftwich, 2005, Process Paper)...Historical Forest Service aerial photographs reveal this damage [from high intensity storms]...The DEIS dismisses the importance of water quantity caused sediment increases and does not analyze this very important impact...The DEIS did not predict sediment yield from peak flow events, which cause increased stream channel bank erosion and downstream sediment deliver, a modeling and data deficiency not disclosed in the DEIS. The DEIS fails to disclose that increased peak flows may well cause increased disturbance of toxic, carcinogenic, and otherwise harmful contaminating sediments."
337	124	"The DEIS doesn't disclose that estimates of water yield increases, such as by WATSED do not model instantaneous events or other storm events."
337	125	"The DEIS also doesn't disclose or analyze that high peak flow events, due to storm events or simply because of land altering cumulative activities, cause instream sediment erosion that affects aquatic habitats."
337	137	"The present DEIS did not even provide that analysis [water yield increases]."
337	138	"The DEIS fails to disclose the Draft Plans potential for causing increased stream flows and flooding resulting from heavy storms common in the Ouachitas constitutes a violation of NEPA regulations Sections 1502.1(b) and 1502.24, requiring that the agency gather high quality information, provide accurate scientific analysis, and insure professional and scientific integrity."

Response

The calculation of sediment levels is actually based on stormflows. Both models used (WEPP and USLE) have rainfall factors. These storm flows, while not specifically displayed, are included in sediment calculations.

Changes in Peak Flows were not addressed. Local research (Miller, Beasley and Lawson, 1986, Stormflow, sedimentation and water quality responses following silvicultural treatments in the Ouachita Mountains) has demonstrated that stormflow volumes and peaks in larger storms were not influenced by such treatments.

Types and Levels of Timber Harvesting

Public Concern: Use of Uneven-age Management Practices

Doc#	Cmt#	Comment
337	186	"The Forest Service needs to consider true uneven-aged management (selection management). The Forest Service must not attempt to use 'patch-clear-cutting' in place of 'group selection.' Group selection does not use area regulation, it uses diameter distribution regulation."
356	199a	"We recommend that timber harvest activities focus on single tree selection & canopy maintenance, with a maximum of 10% canopy reduction resulting."

Response

The Forest Plan projects that uneven-aged management, including single tree selection and group selection, will be employed to meet desired conditions. National policy establishes that a group opening should be no more than 2 acres in size.

Public Concern: Level of Logging Permitted

Doc#	Cmt#	Comment
356	196	"We are very concerned that the preferred alternative would allow logging of 1.1 million board feet/year – almost double that of the 1986 forest plan."
358	214	"Second, the extent of logging allowed under the preferred alternative is excessive—double the level prevalent 20 years ago. A certain level of logging is acceptable in a managed multiple-use forest, but the preferred alternative has gone considerably beyond that level."

Response

The allowable sale quantity (ASQ) increased from 26.2 MMCF to 27.0 MMCF, representing only a slight increase from the 1990 Forest Plan. This amount is less than the ASQ of 32.4 MMCF in the 1986 Forest Plan.

Public Concern: Size Limits for Harvesting

Doc#	Cmt#	Comment
259	71	"Regulations or design criteria on the size of stands (in terms of acres) that can undergo harvest at any particular time should be considered."

Response

The 2005 Revised Forest Plan provides size limits by (suitable) Management Area for even-aged regeneration harvests.

Public Concern: Inadequate Forest Management

Doc#	Cmt#	Comment
379	272	"Of the approximate 1.8MM total acres only 27% (486M) of the acres would be managed by the proposed alternatives in the proposed plan. The preferred alternative...would manage less than 50% (495M) of these 990M acres as and this calculated into 27% of the total 1.9MM acres and this is totally unacceptable for an environmentally healthy forest plan."
379	278	"The plan should manage all of the 990 M acres in the next fifteen years, which calculates into 66M acres per year."
Response		
To enter all acres identified as suitable for timber every 10-15 years would exceed allowable watershed impact levels. Suitable acres are where sustained timber activities are permitted. Project analysis determines where specific activities occur during the plan cycle. Ecosystem health is one factor considered when determining where to apply treatments.		

Technical Corrections**Public Concern: Editorial Corrections**

Doc#	Cmt#	Comment
52	10	"the total acres in the ONF is consistently noted as 1,780,101" Pages 11-17 ... the total comes to 2,037,879"
373	234	"...DEIS refers to an existing Forest Plan when it should refer to a Proposed Revised Forest Plan."
Response		
Corrections have been made in the final documents.		

Public Concern: Southern Pine Beetle Risk Rating of Preferred Alternative

Doc#	Cmt#	Comment
345	188	"Alternative E had the most acres at risk (838,000) from the Southern Pine Beetle (SPB)."
Response		
The error in calculation of this measure has been corrected in the FEIS.		

Public Concern: Clarification of Term "Revised"

Doc#	Cmt#	Comment
292	87	"Revised should be defined for this table [Table S.1]."

Response

Table S.1 compares the preferred alternative as the Proposed Revised Forest Plan Management Areas to the Management Areas in use in the 1990 Amended Forest Plan.

Legal Requirements

Public Concern: Legal Requirements for Forest Plans

Doc#	Cmt#	Comment
379	274	"The law requires a 10 year management plan to be written. Also required is that the proposed plan offer an alternative for maximum positive environmental health, air, water, soil, wildlife, trails, roads healthy industries, positive economic and recreation purposes without constraints. This proposed plan does not have that alternative."
57	24	"Plans do not adhere to ...Statute Section 219.15, Vegetation Management Practices" The vegetation management practices chosen for each vegetation type and circumstance shall be defined in the forest plan with applicable standards and guidelines and the reasons for the choices. Where more than one vegetation management practice will be used in a vegetation type, the conditions under which each will be used shall be based upon thorough reviews of technical and scientific literature and practical experience, with appropriate evaluation of this knowledge for relevance to the specific vegetation and site conditions."

Response

The Revised Forest Plan is the 10-15 year management plan required by law. Within the scope of the reasonable range of alternatives, Alternative C maximizes ecosystem health.

Vegetation management practices for vegetation types are described in detail in the Revised Plan. See Forest-wide and management area-specific standards concerning even-aged management, group selection, single-tree selection, and thinning, including the tables that specifically address these forms of management. In addition, many management areas include specific direction regarding when and where particular practices may be used, and the Plan sets out desired condition statements for each of the community types that are based on best science.

Public Concern: Availability of Appendices for DEIS

Doc#	Cmt#	Comment
337	100	"Appendix B of the DEIS as well as other Appendices are not listed in the table on contents in the printed copy. This violates the public review opportunity... This denies the public an opportunity for reasonable and meaningful review and lets the agency hide its very biased process as discussed herein. Areas were excluded by the Ouachita without allowing the public an opportunity to have any look into this matter in the published documents. This violates NEPA and the Public Trust responsibility of the agency."

Response

The DEIS appendices were not printed and distributed with the DEIS, but they were published on the Forest website, and the availability of appendices upon request was noted on page iii of the DEIS and on page 19 of the Summary. 40 CFR 1502.18 states that appendices must be circulated with the environmental impact statement *or be readily available on request*.

Public Concern: Incorporation of Forest Plan Amendments

Doc#	Cmt#	Comment
337	111	"The DEIS did not disclose the significant amendments to the 1990 Plan and how, or if, they were incorporated into the draft plan."

Response

The starting point for this plan revision was the 1990 Amended Forest Plan, *as subsequently amended*. An electronic version of the Forest Plan that incorporated all amendment language remaining in effect at the time the Notice of Intent was issued was provided on the Ouachita NF website and hard copies of this version were also made available upon request. Notice of the availability of the electronic version of the amended Forest Plan was included in newsletters.

Public Concern: Failure to Meet Intent of Applicable Laws

Doc#	Cmt#	Comment
337	113	"The ONF has failed to meet the intent of the APA, NEPA, and NFMA with its heavy logging and burning alternatives which are all aimed at producing pine to the detriment of many other resources."

Response

Alternatives were formulated to address the significant issues, which strongly featured ecosystem health, not "producing pine"; specific guidance is included in the proposed Revised Forest Plan related to conservation of hardwood stands and hardwoods in pine-dominated stands.

Public Concern: Range of Alternatives

Doc#	Cmt#	Comment
57	23	"...Plan is also deficient in that it does not contain a range of alternatives as required."
263	219	"Please provide an alternative that deemphasizes commercial logging and instead works to restore watersheds."
373	235	"The DEIS is very bloated with irrelevant data from extraneous sources and lacking in on-the-ground analysis. The DEIS has failed totally in the primary purpose of taking a hard look at issues and giving a reasonable range of alternatives. All four of the so called alternatives to the current direction are identical."
373	236	"For example, see table 2.1 DEIS, management areas 18: Trails, has been eliminated from ALL alternatives."
375	248	"We request that a reasonable range of alternatives be included which address the issues and concerns presented herein. The Forest Service must go back and better define the issues. It should reexamine the hundreds of detailed comments provided on the 1989 draft plan, which were largely ignored in the final 1990 plan. Nothing has changed on the forest to address this past input."
337	107	"The Draft LRMP, purpose and need is so restrictive that a reasonable range of alternatives is not presented to the public."
337	108	"...courts have reprimanded the Forest Service for formulating a purpose and need so as to exclude other alternatives."
337	109	"The highly restricted range of alternative evaluated and considered violates the very purpose of NEPA's alternative analysis requirement: to foster informed decision making and full public involvement."
337	165	"Alternatives, which are not connected to logging, must be developed and considered to respond to the majority of Americans who do not want their national forests cut down...Court ruled that while the Forest Service is allowed to log national forests, the Forest Service is not required to cut down the public's forests...Claiming that what the majority of American want is 'beyond the scope of the analysis' is ignoring the public and subverting democracy."

356	189	"...the plan, with its emphasis on resource extraction instead of wildlife habitat, watershed protection and recreation, doesn't address public desires and needs."
375	249	"Include an alternative that manages the forest without commercial logging, off road vehicles, oil and gas development and mining."
337	110	"The DEIS failed to consider reasonable alternative that would have allowed alternative cutting methods and ecosystem preservation that would not be so pine biased as all the Draft LRMP alternative."
165	61	"Please explain why the alternatives under consideration have been limited...What is missing is a significant variation in the alternative offered for consideration...request that an additional alternative be developed that responds to our original scoping letter request...as presented by the Arkansas Sierra Club."

Response

The Forest Service appropriately followed NEPA regulations at Sec. 1502.1 "It [EIS] shall provide full and fair discussion of significant environmental impacts and shall inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment. Agencies shall focus on significant environmental issues and alternatives and shall reduce paperwork and the accumulation of extraneous background data."

Five alternatives were analyzed in detail and several others were considered but not analyzed in detail either because they did not sufficiently differ from the five identified alternatives or they failed to represent reasonable alternatives. Four alternatives (plus the present Forest Plan as the No Action Alternative) were sufficient to address the significant issues and provide a sufficiently broad range of alternatives for consideration. For this revision of the Forest Plan, the scope of the undertaking was limited to changes needed in current management (as represented by the 1990 Amended Forest Plan). Within this scope, the needed changes to the Forest Plan proved modest, and the complexity of the analysis and the number of alternatives required for this FEIS were correspondingly less than those accompanying the 1986 Forest Plan and the 1990 Amended Forest Plan. The range of alternatives considered in detail in this FEIS appropriately reflects the relatively modest need for change and the nature of the significant issues identified. Nonetheless, substantial variation exists among alternatives in terms of projected management activities (e.g., prescribed burning, application of uneven-aged management, thinning acres), acres in the high SPB risk category, acres recommended for wilderness designation, acres in Fire Regime Condition Class 1 or 2, projected annual net revenue for the planning period, population response by terrestrial management indicator species, species viability scores, and OHV use direction.

A no logging alternative was outside the scope that was determined during the early stages of the analysis and public involvement process. Logging in and of itself was not identified as a significant issue, internally or externally. Within the scope of the reasonable range of alternatives, Alternative D has the lowest emphasis on commercial logging. However, the use of timber sales is often the most reasonable and prudent means to meet minimum management requirements for wildlife habitat on this national forest, including habitat for the endangered red-cockaded woodpecker.

Portions of the Sierra Club alternative were adopted in one or more alternatives; others were not, as explained in Chapter 2 of the EIS.

Under this iteration of forest planning, the Forest opted to maintain a consistent number, type, and placement of management areas (in the action alternatives) and to vary the degree and/or type of management that takes place within each management area. MA 18 remained a part of Alternative A. The MA 18 was specifically removed from other alternatives because the new Forest-wide Scenery Management System should serve as a more effective means to maintain or enhance scenic quality than a linear management area that addresses only those areas near the most traveled roads and trails. As Identified in our response to Doc 82, Cmt 33, above, we have included improved protections for trails in the final proposed revised plan.

Public Concern: Formulation of Alternatives/Unconstrained Alternative

Doc#	Cmt#	Comment
379	271	"No alternatives were used to consider the positive environmental health on air, water, soil, wildlife, trails, roads, healthy industries, positive economics and recreation purposes without any constraints placed on budgets, manpower or supervisors direction."
379	275	"...factual data from the forest be entered into the computer with no constraints on budget, manpower or supervisors direction."
379	276	"All other proposed alternatives should show the negative environmental impact and cost to the forest compared to an alternative without constraints."
379	277	"The intent of this plan should reflect the goals and objectives not only for the next ten year but also for the next 150 to 200 plus years."

Response

Alternatives unconstrained by budgets or manpower would be inherently "unreasonable," particularly in an environment where budgets and manpower are steadily declining. In addition to eliminating budget and manpower constraints, the suggested approach to designing an alternative contains too many parameters to incorporate into a reasonable alternative. However, these parameters were certainly taken into consideration when the Responsible Official for this Revised Forest Plan selected the alternative determined to provide the greatest net public benefits.

The legally mandated scope of analysis (36 CFR 219) requires that certain environmental constraints be applied. At the beginning of the analysis process, a range of alternatives was also established, narrowing the latter to a reasonable range. The Desired Condition statements in the 2005 Revised Forest Plan (Part 1) are expressions of the Forest's long-term vision as are the stated priorities and objectives (Part 2). For the analysis, the Forest projected 200 years into the future. Most data published in the FEIS reflect 50-year projections.

Public Concern: No Action Alternative

Doc#	Cmt#	Comment
337	166	"The no-action alternative of the Draft LRMP is not a true no action alternative. It continues the damaging activities of the present plan. Not having a true no action alternative is a violation of NEPA."

Response

The Council of Environmental Quality (CEQ) specifically addressed this concern in its "Forty Most Asked Questions [concerning NEPA]" <http://ceq.eh.doe.gov/nepa/regs/40/40p3.htm>. In response to this very question, CEQ has this to say: "Section 502.14(d) requires the alternatives analysis in the EIS to 'include the alternative of no action.' There are two distinct interpretations of 'no action' that must be considered, depending on the nature of the proposal being evaluated. The first situation might involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed. In these cases 'no action' is 'no change' from current management direction or level of management intensity. To construct an alternative that is based on no management at all would be a useless academic exercise."

Public Concern: "Negative Impacts" of Alternatives

Doc#	Cmt#	Comment
379	273	"None of the proposed alternatives explain ...in laymen terms...the negative impact that these proposed alternatives are costing our forests."

Response

The EIS discusses the full range of environmental impacts. Some clarification has been added to more clearly express the effects of alternatives on forest/ecosystem health in "laymen's terms."

Public Concern: "Paucity of Citations" for Published Research

Doc#	Cmt#	Comment
54	17	"There is a paucity of citations for research published in peer reviewed journals."

Response

Research used in the preparation of the species viability evaluation was largely cited within the Species Viability Evaluation database; however, in the FEIS all of the citations have been added to the references section. In the FEIS, a citation for the SVE (available on the Forest website or upon request) has been added that will lead the reader to nearly 800 references. Appendix E includes short citations (author, year) for these references for each species included in the SVE.

Public Concern: Adequate Involvement of Inholders

Doc#	Cmt#	Comment
373	232	"Inholders [were not integrated] in the planning. When you prepare the Final EIS please comply with 36 CFR Section 219.6 (k)...and include the results in the appropriate section of the EIS." Address West Nile Virus; spreading of Lyme Disease; Ungulant fever and Brucellosis; smoke emissions; use of herbicides."

Response

The revised forest plan does not include a section that addresses private inholders' concerns and interests separately. However, the revised forest plan contains substantial direction that is responsive to inholder concerns that have been expressed over the last 10-15 years, including smoke from prescribed burns, use of herbicides, motor vehicle (including OHV) access, rights-of-way, landownership patterns, military use, recreation access, and public water supplies. See, for example, the desired condition statements for Fire (Community Protection and Safety), Landscape (Scenery) Management, and Transportation System along with standards for use of prescribed fire and herbicides.

Forest inholders were included on the Forest Plan mailing list and received the Plan Revision newsletters as well as other announcements. The numerous public meetings held to discuss issues, present inventories and alternatives and later to explain the commenting process all presented excellent opportunities for discourse on topics related to plan revision. A brief discussion concerning public involvement opportunities for forest inholders has been included in Appendix A to the FEIS.

Public Concern: Response Measures

Doc#	Cmt#	Comment
165	62	"Evaluation Methodology...there is no explanation of the priorities placed by the FS on each of the seventeen Response Measures."
165	64	"Response Measures...revised(d) to incorporate measurements of forest restoration activities...Include categories including miles of existing roads obliterated and restored to native forest and acres of non-native pine plantation restored to native forest, for example."

Response

The Forest did not attach priorities to the response measures; they were used to provide a basis for comparing the alternatives in relative terms. Objectives concerning restoration of native forests in loblolly pine plantations and obliteration of roads have been clarified in the 2005 Revised Forest Plan.

Public Concern: Adequacy of Suitability Analysis

Doc#	Cmt#	Comment
337	140	"...the suitability analysis does not meet the requirements of NFMA and the amount of allowable logging will be detrimental to the forest soil and water resources."

Response

The NFMA itself merely directs the Forest Service to "promulgate regulations, under the principles of the Multiple-Use, Sustained-Yield Act of 1960, that set out the process for the development and revision of the land management plans...The regulations shall include, but not be limited to—(2) specifying guidelines which-(A) require the identification of the suitability of lands for resource management." The 1982 regulations promulgated under NFMA specify that "During the forest planning process, lands which are not suited for timber production shall be identified in accordance with the criteria in paragraphs (a) through (d) of this section." (219.14) The summary of the results of this analysis was presented on page 49 of the Proposed Revised Plan and appears in the 2005 Revised Forest Plan as well. The assertion that "amount of logging will be detrimental to the forest soil and water resources" is not supported by the analytical evidence presented in the EIS.

Public Concern: Role and Nature of Design Criteria (Standards) in the Plan

Doc#	Cmt#	Comment
54	15	"Standards should be stated in defined, unambiguous language in order to inform both the public and Responsible Official what actions are and are not allowed. As an example,... not encouraged.."
165	63	"Design Criteria: These standards should be enforceable and clearly stated so that the public understand what management activity is allowed in each management area."
337	154	"...standards and guidelines for each management prescription for each management area...should be clear, appropriately detailed so that the public cannot have a good idea of what is being planned, and enforceable. Vague, broad statements which do not provide any kind of boundary on agency action do not comply with the requirements of the law."
375	260	"The National Forest Management Act requires each forest plan to contain standards and guidelines for each management prescription for each management area which provide important boundaries on the actions of the agency in implementing the plans. Each management prescription should contain its own standards and guidelines, and they should be clear, appropriately detailed so that the public can have a good idea of what is being planned, and they should be clear, enforceable. Vague, broad statements, which include terms, like "should" or "may" or "at the discretion of" are unenforceable. These kinds of standards and guidelines do not provide any boundary on agency action and do not comply with the requirements of the law."

Response

Standards are designed to guide project design toward achieving desired conditions. During this plan revision, a concerted effort was made to both streamline the number of standards and to write standards in the clearest form possible. Between proposed and final revised plans, we made a concerted effort to refine the language in standards even more, and we eliminated at least one use of "not encouraged" and other vague language.

Public Concern: Differences in Standards Between Draft and Final

Doc#	Cmt#	Comment
337	112	"The DEIS did not disclose the substantive difference in the Draft Plan and present plan standards and guidelines. For example, what streamside protection zone standards are now in place compared to those of the Draft Plan?"

Response

The Forest has clarified the streamside protection areas in the final Plan.

Public Concern: Availability of Forest Service Directives

Doc#	Cmt#	Comment
54	16	"...references to internal guidelines (Forest Service Manual, Forest Service Handbook) should be minimized. If it is necessary to reference these documents, which are not widely available to the public, the applicable text should be included in the Plan Design Criteria (Standards)."

Response

During this plan revision, a concerted effort was made to minimize duplication of guidance in the Plan that is already presented in regulations or Forest Service directives. References to these other sources of guidance are provided in Appendix F. Forest Service directives are readily available at <http://www.fs.fed.us/im/directives/>.

Agency Concern: Consultation Requirements

Doc#	Cmt#	Comment
292	93	"... adding text [concerning consultation with the US Fish and Wildlife Service] to the Threatened, Endangered, and Sensitive Species, and Their Habitats introduction."

Response

Introductory text has been augmented with the following shown in italicized text: "*The Forest Service Manual (FSM 2600)* and standards for the following MAs supply additional guidance for managing habitats of federally listed and Sensitive species and protection of their populations: Wilderness (MA 1), Rare Upland Communities (MA 6), Water and Riparian Communities (MA 9), and Renewal of the Shortleaf Pine-Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat (MA 22)." FSM 2600 covers consultation procedures concerning federally listed species and those proposed for federal listing.

Pesticides

Public Concern: Pesticide Use

Doc#	Cmt#	Comment
57	26	"...forest management should not include the use of herbicides."
375	255	"Chemical pesticides or genetically altered species should not be used on the forest."

Response

Herbicide use on the Ouachita NF is guided by a set of strict Forest-wide and Management Area design criteria. See, especially, Forest-wide Standards in the section titled Herbicide Use and the many provisions for limited use of herbicides or herbicides in riparian areas (Management Area 9, Water and Riparian Communities).

Public and Agency Concern: Herbicide Use – Broadcast Application

Doc#	Cmt#	Comment
92	48	"HU003. Please add the following text. "Broadcast application should be used only for noxious weed eradication/control programs, not for general forestry work."
292	95	"HU003 - Add the following text: 'Broadcast application should be used only for noxious weed eradication/control programs, not for general forestry work.'"
374	245	"...the Commission recommends the allowance of both stem and broadcast application of herbicides for the control of privet, kudzu and fescue...as a preventive measure of control, pre-treatment of <i>Sericea lespedeza</i> , especially along roadsides, in conjunction with prescribed burns."

Response Broadcast applications of herbicide to control non-native invasive species are not precluded by the Plan. The Forest Specialist will monitor the relationship of prescribed burning and the spread of *Sericea lespedeza*; pretreatment with herbicide presents several practical challenges, however, including being able to apply herbicide effectively at least one month prior to the prescribed burn and possible loss of erosion-controlling vegetation along roadsides for months at a time.

Standard HU003 was amended to partially address this concern: It now reads, "To minimize potential effects of herbicide use, whenever possible, use individual stem treatments, directed spraying, and crop tree release rather than broadcast or grid applications. Do not use broadcast or grid applications within Streamside Management Areas (see MA 9 for other restrictions)."

Invasive Species

Public and Agency Concerns: Annual Treatment Acres for Invasive Species

Doc#	Cmt#	Comment
92	46	"...invasive native and non-native species...not consider 200 acres as the maximum annual treatment acres. Rather than suggest a larger acreage, we ask an allowance for flexibility to treat acres identified within budget constraints."
292	91	"...increase the minimum annual acres treated for invasive species to 300 {OBJ02}...important for control of <i>Sericea lespedeza</i> ."
374	246	"...spread of invasive native and non-native species. The planned annual treatment is 200 acres forest wide. We believe there is a much greater need for such treatments and would ask that you no consider 200 acres as the maximum annual treatment acres."
Response		
OBJ03 has been revised to "Treat at least 300 acres per year for non-native, invasive species."		

Public Concern: Invasive Species Introduction and Management

Doc#	Cmt#	Comment
337	159	"The Forest Service should take an aggressive stand on exotic species introduction and proliferation in the ONF. Extensive monitoring should be routine covering intact forest and other ecosystems as well as, and most importantly over logged areas, right-of-ways, and other manufactured opening in the forest. ..Exotic species removal should be carried out manually wherever possible...Herbicide use should be discouraged."
337	178	"The analysis needs to address what impact the timber sale would have on the possible introduction and spread of invasive exotic species."

Response

The Forest Health section of the FEIS includes analysis of biological threats to forest health including outbreaks of insect pests and diseases, and intrusions by invasive, non-native species. The proposed 2005 Revised Forest Plan contains provisions to address non-native invasive species, including a Forest-wide objective to conduct control operations on at least 300 acres per year. Methods for control are always analyzed at the project level; often, mechanical/hand removal will result in fragmenting invasive plants, allowing them to multiply rapidly and make the situation worse. Herbicides may be the only feasible method to insure long-term success in controlling non-native, invasive species in some situations, but that conclusion can only be reached at through project level analysis and decision.

Public Concern: Fire Ant Control

Doc#	Cmt#	Comment
292	83	"...encourage you to develop planning direction for preemptive site-specific fire ant control, although this objective should receive a lower priority than management of invasive plant species."

Response

The Final Revised Plan includes a Priority to "Use an integrated pest management approach to prevent or reduce damage to forest resources from pest organisms, including non-native, invasive species." Given the state of available technology and knowledge, anything more specific about fire ant control would be premature. The Forest Service will continue to work with other federal and state agencies to identify integrated pest control strategies for fire ants and other non-native, invasive insects that pose threats to human health and wildlife and to deploy such strategies where most needed.

Public Concern: Special Forest Products

Doc#	Cmt#	Comment
337	152	"In the Draft Plan and DEIS the FS failed to consider non-timber forest product and their traditional and continuing use by local families for food, medicine, and income."

Response

"Special forest products" was not raised as a major concern internally (Forest Service) or externally (public, other agencies) and therefore was not treated as a significant issue in the EIS; however, standard SU003 in the Revised Forest Plan addresses this concern.

Public Concern: Cost of Timber Sale Program

Doc#	Cmt#	Comment
337	153	"The FS needs to give a clear analysis of how much taxpayer money is lost on the commercial timber sale program on the ONF, and fully disclose how the budget of the ONF is affected by this program...FS should work to find creative ways to redirect the money lost on the timber sale program to employ local individuals in non-commercial restoration activities."

Response

The EIS analyzes revenues that may be expected from certain activities, including timber sales, and compares estimated revenues to expected costs. Estimated net revenue from the projected timber program for the first decade under the Revised Forest Plan is \$6.8 million.

Transportation

Public Concern: Road Density

Doc#	Cmt#	Comment
337	161	"...backlog on road maintenance...Clearly, the Forest Plan for the ONF should move the policy on roads in a new direction...reduce road density, particularly in sensitive areas."
337	162	"It is of special importance to avoid road construction in both inventoried and uninventoried roadless areas."
374	238	"When planning road closures, we recommend the increased use of gates with information signs and reduced use of earthen mounds as road closure devices. Experience has shown that gates re more effective than earthen mounds for road closures."

Response

The Transportation System objectives address these concerns. Also see Forest-wide standards TR004 and TR005.

Agency Concern: Transportation – Definition of "Decommission"

Doc#	Cmt#	Comment
92	41	"...a more complete description of what is meant by road decommissioning is needed in the glossary..."

Response

An expanded definition of road decommissioning is in the glossary.

Livestock Grazing

Agency Concern: Livestock Grazing – Clarification of Restrictions

Doc#	Cmt#	Comment
292	88	"A list of restrictions should be provided to clarify the definition of 'Restricted' within Table S.2"
378	267	"Please see Table S.2, page 18, MA 20, Wild and Scenic River Corridors Column 3 related to Livestock grazing. We would prefer a change from Suitable, Restricted to Not Suitable and Restricted in those areas where streambank erosion might occur from cattle watering."

Response

Table S.2 was revised to better explain the livestock grazing restrictions and to direct the reader to Forest-side livestock grazing standards and Management Areas standards.

Agency Concern: Livestock Grazing - Effects Analysis

Doc#	Cmt#	Comment
357	209	"On page 235 of the Draft Environmental Impact Statement (DEIS), the statement is made that, "There are few cumulative effects from the continuation of the grazing program." Later in the same paragraph the author states: "Because grazing levels are below the estimated grazing capacity of the forest, the cumulative effect of the grazing program is considered insignificant."

Response

This section has been reviewed and rewritten.

Agency and Public Concerns: Livestock Grazing - SMA and Riparian Protection

Doc#	Cmt#	Comment
374	242	"...continue to control livestock numbers and mitigate negative effects by restoring, enhancing, or maintaining the integrity of stream channels and banks. We also ask as interest in the use of existing woodland allotments diminishes, or if declining range conditions indicate, you place a priority on phasing out woodland grazing permits."
92	49	"LG002. ...text...which would specify that allotment plans include forage improvements by way of thinning and prescribed burning along with development of small ponds as livestock water sources, and conversion of off site loblolly pine plantations."
292	96	"Livestock Grazing, LG 002 – Add the following text: 'Allotment plans will include forage improvement by way of thinning and prescribed burning along with development of small ponds as livestock water sources, and conversion of off –site loblolly pine plantations.'"
292	97b	"Add [suggested] standards [to Livestock Grazing]: Where grazing is currently allowed, control livestock numbers and mitigate negative effects to restore, enhance or maintain the integrity of stream channels and banks. Feeding troughs or water troughs will not be placed in riparian zones or defined channels. Salt blocks and mineral blocks will be placed in boxes or containers to control leaching into soils and will be placed in allotment uplands to encourage forage use away from riparian zones."

Response

Provisions to protect resources from cattle grazing, including protection for Water and Riparian Areas (Management Area 9), are provided in Table 3.10 and in other MA 9 standards and in Forest-wide standards LG001 through LG004. LG005 now states that "Grazing allotment plans will be designed to minimize effects on water quality, recreation use and timber production. Grazing will be restricted if adverse impacts on water quality, recreation use, or timber production becomes evident."

Requirements specific to each allotment will be addressed at the project level. Actions such as prescribed burning, thinning, restoration of native species, and development of livestock water sources are allowed in the management areas where the grazing allotments exist, with exceptions and extra limitations for MA 9.

Public Concern: Livestock Grazing – Protection of MA 21 and 22

Doc#	Cmt#	Comment
92	45	"Because of the potential for selective grazing to interfere with the restoration of the bluestem component of the ecosystems, we recommend that impact of grazing in Management Areas 21 and 22 be closely monitored."

Response

The Forest agrees, and it is the intent to do so. There is relatively little cattle grazing on national forest lands in or near the vicinity of Management Area 21. In fact, most of the remaining grazing allotments and by far the greatest number of cattle unit months are in the Broken Bow unit of the Oklahoma Ranger District, which was acquired in late 1996 and has a long history of grazing allotments.

Nonetheless, in response to this comment, a new standard (21.03) was added: "Restrict livestock, except where grazing is necessary, based on site-specific analysis, to mimic the ecological role formerly played by elk and bison. When livestock are in use on surrounding lands, consider their impacts on vegetation on a site-specific basis; in general, fencing should not be necessary. Livestock will not be physically excluded from MA 21." For MA 22 the following standard is in the 2005 Revised Forest Plan "22.08 Livestock grazing may utilize up to 25 percent of the annual forage growth, but will not exceed this amount."

Public and Agency Concern: Livestock Grazing - Restoration of Native Species

Doc#	Cmt#	Comment
292	85	"We encourage the Forest to develop plans to convert any existing fescue and Bermuda pastures to native warm season forage species."
92	47	"...support a higher priority planed on conversion to native species and would lie to see more than 500 acres annually treat...place emphasis on initial allocation of these acres to Oklahoma portions of the national forest within existing range allotments."
92	50	"No new non-native planting should be allowed. Feeding troughs or water troughs should not be placed in riparian areas. Salt block and mineral blocks should be placed in boxes or containers to control leaching into soils and should be placed in areas which will encourage grazing away from riparian zones. "

Grazing in MA 20, Wild and Scenic River Corridors, remains "suitable;" however, specific standards for additional protection of these corridors were added. See standards LG002 and LG004; Table 3.10 (Management Activities Permitted or Prohibited within Streamside Management Areas (SMAs)); and standard 20.03 (Wild and Scenic River Corridors): "Livestock grazing levels will not be increased. Measures will be taken to minimize livestock use of the rivers themselves, including construction of alternative water sources outside the corridors. No livestock distribution facilities or convenience structures (i.e. salting and dusting stations, corrals) will be constructed or placed in MA 20."

Public Concern: Livestock Grazing - Woodlands

Doc#	Cmt#	Comment
356	203	"We are concerned about the potential for increased livestock grazing with creation of savannah/woodland areas, and request that no there be no increased livestock grazing allowed under the final forest plan."
357	-210	"...we believe that livestock grazing on MA 22 should be eliminated or severely restricted until research has been completed to define the impacts of cattle on pine/bluestem restoration."
357	208	"The <u>Design Criteria</u> section for MA 21(pg 112) states that livestock grazing will be limited: "Restrict livestock, except where grazing is necessary based on site-specific analysis to mimic the ecological role formerly played by elk and bison. When livestock are in use on surrounding lands, consider their impacts on vegetation on a site-specific basis..." We believe this criterion should apply to MA 22 also."

Response

Range allotments and the number of grazing animals (animal unit-months) are declining steadily on the Ouachita NF and are likely to continue to decline. Where grazing continues, safeguards are in place to protect resources. In the general Forest area, grazing of only up to 50% of available forage is allowed. Allotment management plans address potential overgrazing in the woodlands of MA 22. Within this Management Area, available forage is calculated on the basis of 25% utilization rather than the standard 50% utilization in the rest of the Forest. Effects of grazing are monitored, and the Forest has the ability to apply additional controls should adverse effects to woodland areas become evident.

292	92	"...FWS would like to see more than 500 acres per year converted to native habitat types. If this is not possible, place emphasis on initial allocation of these acres to Oklahoma portions ... in range allotments...provide an increased forage base away from sensitive streams and riparian areas and reduce the streamside grazing pressure issues."
374	247	"If you have improved pasture systems in non-native forage species such as fescue or Bermuda grass we ask that you add language or standards that would plan for conversion to native forage grasses. No new non-native planting should be allowed."
292	97a	Add [suggested] standards [to Livestock Grazing]: "Pasture or field systems currently in non-native plant species, such as fescue or Bermuda grass, will be converted to native cool or warm season grasses as opportunities or budgets allow. When seeding to establish or maintain range forage in pastures and openings, use native species compatible with the ecological site."
292	97c	"Existing permitted woodland allotments will be phased out as permits are terminated, or if range condition dictates. Provide structural and non-structural improvements that meet overall management goals and objectives to obtain desired livestock distribution and proper forage use throughout grazing allotments."

Response

The following components of the Revised Forest Plan, most of which were adjusted between draft and final, respond to these concerns: Standards LG002 (discussed previously under Livestock Grazing - SMA and Riparian Protection) and LG004 ["No livestock distribution facilities or convenience structures (i.e. salting and dusting stations, corrals) will be constructed or placed in riparian areas, streamside management areas, or floodplains"]; Table 3.10 (Management Activities Permitted or Prohibited within Streamside Management Areas); and (within Wild and Scenic River Corridors), standard 20.03 ["Livestock grazing levels will not be increased. Measures will be taken to minimize livestock use of the rivers themselves, including construction of alternative water sources outside the corridors. No livestock distribution facilities or convenience structures (i.e. salting and dusting stations, corrals) will be constructed or placed in MA 20."]

OBJ11 addresses conversion of offsite loblolly pine plantations to native species by establishing an objective to "treat at least 500 acres per year. " The Revised Forest Plan does not preclude treating additional acreage for conversion to native species.

There are few fescue or Bermuda grass pastures within the Ouachita NF. The Forest is moving to restore those to native species. Few woodland allotments exist and, due to choices made by permittees, the number of such allotments is declining. Required structural and non-structural improvements that are necessary for livestock grazing are addressed in the site specific range allotment plans.

Soil Productivity, Soil Productivity Monitoring

Public Concern: Soil Productivity

Doc#	Cmt#	Comment
337	117	"The DEIS sorely misses the issue of maintaining soil productivity. The Forest Service does not have any reasonable amount of substantive, quantitative monitoring of soils in the Ouachita to support claims of protection of the soil resource as the DEIS claims... There is simply no watershed level analysis of soil impacts. The DEIS ignores the larger issue of soil productivity and watershed impacts."
337	118	"The meaning of soil productivity in the terminology of NFMA is largely ignored by the Forest Service... the FS still cannot assume that there has been no 'significant or permanent impairment of the productivity of the land' as NFMA requires."

Response

The EIS addressed soil productivity concerns. The allegation that the Ouachita NF has not conducted or supported substantive, quantitative monitoring of soils is incorrect. See subsequent section for a list of relevant studies and associated reports. Comment 118 is not well informed. The Forest has not ignored the meaning of soil productivity and assumes nothing when it comes to maintaining the productivity of the land. Maintaining or improving long term soil productivity is a common concern that is elaborated upon in the EIS and addressed in depth by design criteria specified in the Revised Forest Plan (See "Soil and Water Resources" in Part 3 of the 2005 Revised Forest Plan). The Forest has and will continue to pro-actively pursue monitoring and scientific studies (see, for example, those listed in the response area of the following section) that evaluate the relationships between management actions and maintenance of long term soil productivity.

Public Concern: Monitoring/Research to Validate the Effectiveness of Mitigation Measures for Soils

Doc#	Cmt#	Comment
337	115	"The Forest Service on the Ouachita relies upon mitigation for soils, but cites no monitoring or scientific studies to validate the effectiveness of the mitigation."
337	121	"...federal courts have evaluated the adequacy of mitigation measures the EISs and EAs rely upon. Relying upon inadequate mitigation measures to protect soils fails to meet this judicially specified test of compliance with NEPA regulations. The Forest Service must have scientifically sound monitoring upon which to base its DEIS analysis. This monitoring does not exist on a reasonable sampling of typical ONF timber sales. Thus, the DEIS has no data for its analysis."

Response

The Ouachita NF has worked with cooperators from universities and the Forest Service's Southern Research Station to complete a number of scientific studies relating to soil productivity and the possible need for added mitigation. Additionally, the Forest has been active with soil productivity monitoring. Our Forest monitoring results agree with the scientific studies performed in the Ouachita Mountains and scientific expert opinion that those management activities performed on the Ouachita NF are not resulting in loss of long term soil productivity. Some of the latest Ouachita National Forest specific research and monitoring studies are listed below and cited in the EIS:

Scientific studies:

- Beasley, R.S., Miller, E. L. and Lawson, E. R.. 1987. Chemical Properties of Soils and Streams in Natural and Disturbed Forest Ecosystems in the Ouachita Mountains. Publication No. 132. Technical Completion Report Research Project G-1212-02. Arkansas Water Resources Research Center.
- Ku, T.T. and Lawson, E.R. Jan. 1993. Soil Nutrient Study Data Analysis and Interpretation – Ouachita National Forest. Report submitted from Dept. of Forest Resources, U of A at Monticello. 16 p. unpublished.
- Liechty, H.O., Luckow, K.R. and Guldin, J.M. 2005. Soil chemistry and nutrient regimes following 17-21 years of shortleaf pine-bluestem restoration in the Ouachita Mountains of Arkansas. Forest Ecology and Management 204 (2005): 345-357.
- Liechty, H.O., Luckow, K.R., Seifert, J., Marion, D.A., Spetich, M., and Guldin, J.M.. 2004. Shortleaf Pine Ecosystem Restoration: Impacts on Soils and Woody Debris in the Ouachita Mountains of the Southern United States. 16th International Conference, Society for Ecological Restoration, August 24-26, 2004, Victoria, Canada. 5pp.
- Leichty, H.O., Shelton, M.G., Luckow, K.R. and Turton, D.J. 2002. "Impacts of Shortleaf Pine-Hardwood Forest Management on Soils in the Ouachita Highlands: A Review." Southern Journal of Applied Forestry, Vol. 26, No. 1, pages 43-51.
- Masters, R.E., Engle, D.M and Robinson, R.. 1993. Effects of timber harvest and periodic fire on soil chemical properties in the Ouachita Mountains. SJAF 17:139-145.
- Scoles, S., Anderson, S., Turton, D., Miller, E. Undated. Forestry and Water Quality: A Review of Watershed Research in the Ouachita Mountains. Circular E-932, Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and natural resources, Oklahoma State University. 30pp.
- Stanturf, J.A., Marion, D.A., Spetich, M., Luckow, K.R., Guldin, J.M., Liechty, H.O., and Meier, C.E.. 2000. Soil quality and productivity responses to watershed restoration in the Ouachita Mountains of Arkansas, USA. In Forest Ecosystem Restoration: Ecological and Economical Impacts of Restoration Processes in secondary Coniferous Forests; Proceedings of the International Conference held in Vienna, Austria; ed. Hubert Hasenauer.

Wheeler, G. L. and Eichman, J.K., Feb. 1991. The Effects of Forest Management Practices on Soil Nutrient Status – A final report to the USFS, Ouachita NF. Cooperative Agreement #19-90-056 with the U of A. 56 p. unpublished.

Monitoring Studies:

Luckow, K.R. 2000. Effects of shortleaf pine-bluestem ecosystem restoration on long term soil productivity on the Ouachita National Forest. 21pp. Monitoring report (on file).

Luckow, K.R. 2000. Effects of shortleaf pine-bluestem ecosystem restoration on soil quality on the Ouachita National Forest – Implications for improved water and air quality and watershed condition. 14pp. Monitoring report (on file).

Luckow, K.R. 1999. Monitoring Results of Prescribed Fire on Soil Erosion, pH and nutrient levels from two prescribed burns on the Caddo Ranger District of the Ouachita National Forest. (Report on file).

Luckow, K.R. 1998. "Soil compaction monitoring of 20 timber harvest unit subplots on the Ouachita National Forest. In: Appendix D of the Environmental Assessment for Amendment No 27 to the Forest Plan for Changing Applicable Forest Plan Standards and Guidelines Related to Soil Compaction and Normal Operating Seasons." May, 1998. USDA-Forest Service, Ouachita National Forest, Hot Springs, Arkansas.

Public Concern: Soil Productivity Standards

Doc#	Cmt#	Comment
337	119	"Also, soil productivity can only be assumed to be maintained if it turns out that the soil Standards work. To determine if they work, the Forest Service would have to undertake objective, scientifically sound measurements of what the soil produces (grows) following management activities. But the FS has never done this on the ONF."

Response

The Southern Region and Ouachita NF soil quality standards were developed by scientists from both the academic and Forest Service communities as threshold indicators to determine if soil productivity is being maintained. These threshold indicators, which are designed to be measurable on the ground, include soil compaction, displacement, organic matter retention, erosion and deep tire rutting. The Ouachita NF has been monitoring these standards for a number of years, even prior to their becoming Regional soil quality standards. Two notable "scientifically sound" monitoring studies include the Forest soil compaction study and the pine-bluestem restoration soil quality monitoring study cited in the previous section. These were performed in cooperation with the Southern Research Station and University of Arkansas, School of Forestry at Monticello. The Forest also monitors soil quality standards in a more general way through timber sale administration, other soil disturbing projects using contracting officer representatives or Forest Service representatives, Implementation Management Reviews, and spot checking of project work by forest soil scientists. In addition, the Forest Service has established long term soil productivity monitoring plots across the nation, through Forest Service Research units, to test how well these standards work.

Doc#	Cmt#	Comment
337	120	"The DEIS must include estimates of damage to soils and must include all potential sources of detrimental soil disturbance for Draft Plan actions."

Response
The EIS discusses and analyzes the major sources of detrimental soil disturbance as it relates to the Forest's soil quality standards. In addition, a comparative estimate of erosion by alternative is given in Figures 3.5 and 3.6.

Prescribed Fire, Smoke, and Fuels

Public Concern: Data Concerning Prescribed Fire

Doc#	Cmt#	Comment
54	18	"DEIS is deficient in ... empirical data that ... Prescribed burning in the dormant season adequately mimics the ecological impacts of the historic fire regime in the Ouachita mountains (late-growing season) and is an acceptable practice for ecosystem restoration and maintenance."

Response
Use of dormant season prescribed burning on the Ouachita NF is not based on a premise that it "adequately mimics the ecological impacts of the historic fire regime in the Ouachita Mountains." While the Forest recognizes that fire has been an important ecological force in the Ouachita Mountains for thousands of years, the modern use of prescribed burning on the Ouachita NF is based more on its demonstrated efficacy as a tool for creating or maintaining desired vegetation structure and composition (and other desired ecosystem attributes) than an attempt to mimic the fire regime of any particular era. The roles and effects of prescribed burning in both the dormant and growing season have been extensively and intensively examined in research efforts in Ouachita Mountain ecosystems, as summarized in the FEIS. Literature references relevant to this question have been added to the FEIS. While the 2005 Revised Forest Plan calls for continued use of dormant season burns, it also calls for increased use of growing season burns. There is some debate among scientists about seasonality of burning in the pre-European forest. The best estimate is that about 20% of the pre-European burning occurred during the growing season (Rich Guyette, personal communication.)

Doc#	Cmt#	Comment
54	19	"DEIS is deficient in ... empirical data that ... Fire return intervals were as frequent as the USFS contend, particularly in late-successional habitats."

Response
The FEIS clarifies that desired fire return intervals for ecological systems are estimates and are based on a variety of sources, including General Land Office descriptions of 19th century forests (Foti and Glenn), dendrochronology studies (Guyette) and ecological (or biological) requirements of specific fire-adapted species and/or communities (Masters and others). The peer-reviewed results found in the ecological system descriptions represent a consensus opinion among leading experts.

54 20

"DEIS is deficient in ... empirical data that ...the fuel reduction activities that are mandated (not simply allowed, as you are designating "treatment " targets to measure compliance with the Plan) by the proposed Plan Revision will actually reduce the risk of large scale fire events, and associated threats to life and property."

Response

The FEIS clarifies that the expected effect of the projected program of prescribed burning is to lower and maintain fire regime condition class and restore some of the forest to woodland communities. Fuel loading (amount and kind of fuel) in woodlands is lower than in closed-canopy forests (e.g., fuel model 2 conditions versus fuel model 9). The expected outcome of vegetative changes from forest to woodland is to lower the risk of catastrophic (stand-replacing) fires in treated areas with less total fuel and no ladder fuels to carry fire into other canopy layers. The 2005 Revised Forest Plan places a priority to first treat critical wildland urban interface areas and lands adjacent to communities at risk.

Doc#	Cmt#	Comment
54	21	"DEIS is deficient in ... empirical data ... That the fuel reduction activities that are proposed will not increase the probability of large scale fire events (the proposed fuel reduction activities could very well lead to such an increase due to the results of the treatments which would lead to increased fine (1 hr) fuel loading (increased herbaceous growth), and more direct sunlight penetration to the forest floor, which would, logically, lead to lower fuel moisture values, the increased probability of ignition , a faster rate of spread, and a higher fireline intensity, conditions that would cause fires to be <u>more</u> difficult to control)."

Response

The FEIS clarifies that, while it is true that restoration of some fire-adapted ecological communities could result in a slightly more fire-prone landscape (dry, grassy fuels are easily ignited and have relatively high rates of spread), energy release of fires in grassy fuels is generally lower than in the case of densely forested sites. As a result, fire-caused scorch, damage, and mortality to woody vegetation are reduced. Fires in woodlands are generally easier to control with mechanized equipment than are fires in closed-canopy forested conditions. The light, grassy fuel components are usually quickly extinguished. Higher rates of control line construction are possible in woodlands both for hand crews and equipment.

The fireline handbook shows increases in line production rates for mechanized equipment for both Fuel Model 9 (FM9), hardwood and conifer, as opposed to Fuel Model 2 (FM 2). Therefore, line production with dozers should be helped by conversion to more grassy fuels. Manual production rates for conifers are marginally improved by converting to FM2. Production rates of engine crews (wetline) decrease when changing from FM9 hardwood to FM2. Woodlands are usually easier to access and are safer environments for firefighters (better visibility and movement, minimum mop-up and/or lower threats of re-ignition).

Doc#	Cmt#	Comment
337	158	<p>"The Forest Service is heavily using fire as a management tool on the ONF and plans to almost double the annual amount...The DEIS as well as timber sale decisions on the ONF do not assess the impacts of burning upon soil, water, increased storm run off downstream channels and most importantly human health effects...There is wide discrepancy in the literature on the effects and necessity of fire in the Ouachita region. While some literature espouses the necessity of fires as a tool to maintain Ouachita forest, or to re-create pre-colonial conditions, there is a substantial body of literature arguing that the use of fire, over varying spatial and temporal scales, may be extremely damaging to our native forest and the soil and water resource. The Forest Service should make evident all studies and other information that it is using in the application of fire on the Forest."</p>
Response		
<p>The 2005 Revised Forest Plan has a lower projected average annual acres to be treated with fire—180,000 acres instead of 200,000 acres—than the draft plan. While the use of fire is still expected to increase over the current average of about 100,000 acres per year, the increase in the average annual acres of prescribed burning is likely to be gradual and may be adjusted if the results of monitoring show a need to decrease or increase the projection:</p> <p>Based on research conducted on the Ouachita NF, prescribed burning is not expected to adversely affect soil, water, or biological resources, as documented in the FEIS. Water resources are protected by stringent soil and water protection measures, including those of Management Area 9. The Streamside Management Areas the Ouachita NF designated are far more restrictive than State Best Management Practices in terms of allowable silvicultural activities and are applied to all streams with defined channels, not just perennial and intermittent streams.</p> <p>We know of no discrepancy between the environmental consequences disclosed in the DEIS/FEIS and any current research or "body" of scientific literature whose findings indicate that prescribed burning in the Ouachitas to be "extremely damaging." and the author of this comment did not provide evidence of "a substantial body of literature arguing that the use of fire...may be extremely damaging to our native forest and the soil and water resource. Additional references have been cited in the FEIS to document the body of work that demonstrates the actual effects of prescribed burning on various biological and physical components of Ouachita Mountain ecosystems.</p> <p>There is no contradictory relationship among fire management, timber harvesting and meeting public needs. The opposite is true, however. There is a direct link between goals in ecosystem management (e.g., restoring, maintaining and enhancing fire-adapted ecological communities) and reducing hazardous fuels and the threat of catastrophic fire. A variety of vegetation management methodologies in fire-adapted ecosystems may be necessary to lower condition class and restore ecological communities to the reference condition. In some areas, commercial thinning will be needed to reduce overstory densities to pre-settlement estimates. In other areas, midstory densities will need to be reduced. In some places, the control of non-native invasive vegetation could be needed. Treatment tools might include timber harvesting, chemical and non-chemical hand treatments of midstory vegetation, mechanical treatments and/or prescribed burning. Restoring and maintaining healthy ecosystems through a combination of treatments will change existing fuel types, loadings and profiles to conditions less hazardous to both to the public and firefighters when wildfires do occur. These goals are embodied in the National Fire Plan, Healthy Forest Initiative and Healthy Forest Restoration Act and are integral to the draft Plan goals and objectives.</p>		

Doc#	Cmt#	Comment
165	66	"Prescribed Fires:...there is insufficient documentation in the DEIS to evaluate this [level of activity]. Further, the DEIS estimated that 63% (1,140,267 acres) of the ONF is in the worst fire regime condition category...request that the DEIS be modified to reflect only the prescribed burning required at the WUI until such time that sufficient scientific analysis of past prescribed burning has been conducted and presented for public review."
Response		
The DEIS/FEIS references research and a recent species viability evaluation that support the revised Plan in relation to annual prescribed burning needed to meet resource needs. The finding in regard to condition class found in the DEIS/FEIS derives from a Regional mid-scale study based on existing conditions as compared to an estimated pre-European or "reference conditions." The abundance of condition class 3 stands represents a severe departure from the reference condition across the Forest. We share a common desire to set a high priority for burning in the Wildland-Urban Interface (WUI). Ecological restoration of fire-adapted ecosystems addresses a wide variety of needs, including habitat restoration for federally endangered species, game and non-game habitat restoration, maintenance and enhancement and hazardous fuel reduction in non-WUI areas that will significantly reduce the risk of catastrophic fire.		

Doc#	Cmt#	Comment
145	59	"...neither controlled burns nor logging are necessary to prevent out-of-control wildfires or to maintain a 'healthy' forest. The forest can take care of those things itself, even if individual trees die."
Response		
The desired ecological condition descriptions in the DEIS/FEIS and in the 2005 Revised Forest Plan are considered the best estimates of forest or woodland conditions that are ecologically sustainable, including habitat sustainability for native plants and animals. These descriptions are not a unique Forest Service perspective or opinion, but the result of research work specific to the Interior Highlands of Arkansas, Oklahoma and Missouri and strong collaborative work among ecologists, archeologists and others familiar with Highlands ecosystems, past and present. Relying solely on passive management is likely lead to more ecological imbalance and dysfunction (as illustrated by rampant oak decline and oak borer outbreaks), loss of key habitats, and further endangerment of sensitive species. The use of a suite of vegetation management practices to restore and maintain fire-adapted ecosystems is rooted in the desire to have resilient and diverse ecological communities.		

Doc#	Cmt#	Comment
356	190	"The preferred alternative has several notable omissions as it addresses the use of fire as a forest management tool. It is based on an intensive management model of forest management assuming the desirability of a historic human-generated forest condition. This model is not part of the current forest management plan and public input was not considered in its development."

Response		
The use of fire in forest management includes some silvicultural burning to facilitate reforestation but is primarily focused on ecological restoration activities. The desired conditions described are considered the best estimates of forest or woodland conditions that are ecologically sustainable, including habitat sustainability for native plants and animals. Scientists generally agree that the aboriginal role in influencing these landscapes was, in the purist sense, natural.		

Doc#	Cmt#	Comment
356	191	"The preferred alternative also completely lacks cumulative air and water quality assessments, especially concerning effects of large-scale fires on human health...effects of smoke and particulate matter harming the many thousands of persons in Arkansas and surrounding states who suffer from asthma, emphysema, chronic bronchitis and COPD medical health conditions. We strongly request that total program impact to human health by prescribed fires under this alternative be assessed, including coordination with other agencies conducting prescribed fires in the region."
Response		
The expected effects of prescribed burning and smoke are documented in the FEIS. Current project-level planning includes identification and avoidance of smoke-sensitive targets along with public notification for every burn. The Forest Service will meet state smoke management guidelines when conducting prescribed burns.		

Doc#	Cmt#	Comment
356	193	"This program is based on dubious science and if it is to be continued at the current or recommended levels there is a great need for additional research to give the public confidence in the assumptions being used, such as studies of the historical pollen and charcoal record to tell us pre-settlement forest composition. Another element that is missing is fire scar studies of oak/hickory forests in later settled areas, such as the interior highlands."
Response		
While the Forest agrees that more research (particularly fossil pollen studies, where feasible) is desirable, the contention that the science used in the EIS is "dubious" is unsupported. Unfortunately, there are very few sites in the Ouachita Mountains where vegetation history data in the form of fossil pollen profiles may be studied; appropriate depositional environments such as bogs and fens are not available. The recommendation regarding the use of fire scar studies in the oak/hickory was the subject of cited works by Dr. Rich Guyette and others and was used in the analysis.		

Doc#	Cmt#	Comment
356	195	"...concerned that the mostly low-intensity fires that are being conducted are actually preserving snags and creating charcoal that would otherwise harmlessly decompose in a short time...no site-specific documentation of fire-dependant areas that are supposedly being restored as a result of this program... how a program that isn't reducing the danger of forest fires and isn't performing site-specific restoration activities can be beneficial to forest health. We request that acreage using prescribed fires as a management tool be scaled back to approximately the 1986 level, with fires only used on a site-specific basis to maintain glades or wildlife openings. "
Response		
Contrary to these assertions, the Ouachita NF is successfully restoring fire-maintained ecosystems. There is a nationally recognized restoration area on the Ouachita NF. (MA 22 in Arkansas), and there are over 40,000 acres of condition class 1 acres (near reference condition) in the Red-cockaded Woodpecker habitat management area of the Poteau and Cold Springs Ranger Districts. All the condition class 1 areas are at a significantly lower risk of catastrophic fire than areas that are condition class 2 or 3 and are more ecologically resilient and sustainable. These areas have been recognized by various conservation groups as showcases for the efficacy of restoration efforts.		

Doc#	Cmt#	Comment
361	218	"Smaller burns that bracket unburned areas should be encouraged. the whole forest should not be burned at one time."
Response		
Prescribed burns are carefully planned with smoke-sensitive target identification and avoidance a part of every plan. Public notification is also an integral part on each burn. Compliance with all state and federal air quality guidelines is incorporated at both the project and programmatic planning levels.		
Doc#	Cmt#	Comment
372	230	"...concerned about the current burning practices and use of tax dollars on an activity that is damaging to Arkansas hardwoods."
372	231	"...reconsider the expanded logging plans and help preserve water quality in all the forest stream systems. Greater extraction and burning will combine to negatively impact this vital resource."
Response		
While it is true that not all hardwood is part of a fire-adapted ecosystem, oaks and some other hardwoods are fire-adapted. The role of fire in oak forests was covered at a 2002 Oak Ecology Symposium held in Fayetteville, AR and cited in the DEIS/FEIS. This publication along with other research indicates the role of fire in oak forests to be the single-most important natural disturbance agent needed to help perpetuate oak forests. Rather than damaging or negatively impacting oak forests, fire will lead to more resilient, functioning ecosystems.		
378	268	"We understand the science of thinning, regeneration and some prescribed fire to reduce fuel loads. The massive amount of acreage scheduled for repeated burning seems excessive to virtually all Ozark Society members."
Response		
The reduction of fuel loads should be viewed as a secondary benefit in the context to restoring the role to fire-adapted ecosystems. The projected prescribed burning program responds primarily to the desire to improve the condition class of current stands and restore areas to desired conditions beneficial to the full suite of native plants and animals in the Ouachita Mountains. The amount of burning being proposed is modest in comparison to the amount that would actually be needed to fully restore all the fire-adapted ecological communities on the Forest.		
Public Concern: Wildland Fire (Natural Ignitions)		
Doc#	Cmt#	Comment
367	228	"We also support the use of wildland fire (natural ignitions) to accomplish set objectives when it is properly planned for and can be safely accomplished."
Response		
National forest managers may respond to unplanned, natural ignitions by managing the fire under prescribed conditions, allowing it to burn to roads or natural barriers as long as it meets resource objectives and doesn't threaten private property or public resources.		

Public Concern: Smoke from Prescribed Burning

Doc#	Cmt#	Comment
11	1	"Herbicides are much less damaging to the environment than the vast amount of smoke you are sending into the atmosphere."
291	78	"...irresponsible of the FS not to do an Environmental Assessment of the cumulative impact of all the fires proposed. Such an analysis should consider air pollution generated by other prescribed burns (Ozark-St. Francis NF, U.S. Park Service, Nature Conservancy, private land, etc) as well as all other sources."
361	216	"No regard is mentioned related to the harmful effects of burning on persons with asthma who experience attacks when immersed in excessive smoke situations."
361	217	"Plan should require that an annual list be made of asthma stricken person in each ranger district and require notification of the persons who have asthma on days when prescribed fire could cause deadly harm to asthma effected persons."
358	213	"If the burning schedule now employed by the USFS is any guide to future burning practices, there is likely to be a decrease in biodiversity, since many species' particular life cycles and habitats are not given any specific attention. Health effects of particulates sent by the burns over populated areas are inadequately considered."

Response

The effects of smoke on the environment are addressed in the DEIS and FEIS. The States' Department of Environmental Quality and Forestry Divisions have primary responsibility for monitoring compliance with the Clean Air Act as it applies to prescribed burning. The cumulative effects of smoke from prescribed burns are monitored and regulated by the States. The Ouachita NF will comply with the states' Smoke Management Plans and meet all state and federal laws related to air quality standards. Additional discussion has been added to the Air Quality section of the FEIS to describe the effects of smoke.

The identification of smoke-sensitive individuals that could be affected by prescribed burns is done at the project-level, i.e. by Ranger Districts. Smoke screening and avoidance of smoke sensitive targets is part of every burning plan. Public notification (including personally contacting smoke-sensitive individuals that may be affected) prior to burning is done through local media, to local law enforcement offices and through the internet at a special website designed specifically for this purpose.

Contrary to the concern that a "decrease in biodiversity" is likely due to increased burning, the Species Viability Evaluation, as summarized in the EIS, documented a positive relationship between burning and biodiversity.

Public and Agency Concerns: Monitoring the Results of Prescribed Fires

Doc#	Cmt#	Comment
92	43	"Increased monitoring of the expanded burn program should be emphasized to quantify efficacy of treatments against objectives."
292	81	"If through monitoring and the best science you learn that planned burn acres need to be adjusted up or down, you should incorporate into the final Plan the latitude to adjust without having to revise the Plan."
337	155	"The plan should provide adequate monitoring requirements to ensure that the plan will not result in damage to the forest....in-the-field monitoring of an adequate range of forest species..."
356	194	"Needed monitoring of the effects of repeated burning on animal and plant species is not in process or planned. We believe there is a strong possibility that non-native and fire-dependant invasive species could be established as a result of this program, for example, and without adequate monitoring this type of unforeseen problem could get out of control quickly."
375	259	"The plan should provide adequate monitoring requirements to ensure that the plan will not result in damage to the forest. This should include requirements for in-the-field monitoring of an adequate range of forest species, including species mentioned above. These requirements should be mandatory and frequent."
356	192	"We also request that watershed-specific assessments be conducted to gauge the total watershed impacts of the prescribed fire program as it is currently being conducted and also as it is being proposed."

Response

Although there is substantial evidence of the efficacy of prescribed burning in Ouachita Mountain ecosystems, the Forest concurs with the need to continue improving our monitoring of the effects of burning. A recent Southern Region supplement to the Forest Service Manual concerning fire use (FSM 5140) updates and considerably enhances the emphasis on monitoring the effects of prescribed burning. Monitoring the effects of prescribed burning has been added as a Priority in Part 2 of the 2005 Revised Forest Plan.

Intensive studies of the effects of prescribed burning on native plants, animals, and soils have been conducted on the Ouachita NF. As documented in the FEIS, these studies are sufficient to determine that, for the most part, the effects of prescribed fire on plant and animal habitats and other ecosystem components are well understood. Monitoring and research studies will continue to be conducted where needed to elucidate the relationships between fire and particular species (for example, studies of the relationship between fire and Ozark chinquapin or between fire and the spread of non-native, invasive species).

The Revised Forest Plan can be amended, as needed, to adjust objectives for prescribed burning. Under the 2005 planning rule, such amendments should be relatively simple exercises. (The Ouachita NF will fully transition to the 2005 planning rule no later than January 2008).

Doc#	Cmt#	Comment
375	251	"Due to water pollution, air pollution and health impacts cease prescribed burning. Until burning is ceased perform pre and post burn ecological surveys on all burn areas."
Response		
The roles and effects of prescribed burning in both the dormant and growing season have been extensively and intensively examined in research efforts in Ouachita Mountain ecosystems, as summarized in the FEIS. Literature references relevant to this question have been added to the FEIS. Based on research conducted on the Ouachita NF, prescribed burning is not expected to adversely affect soil, water, or biological resources, as documented in the FEIS. Water resources are protected by stringent soil and water protection measures, including those of Management Area 9. The Streamside Management Areas the Ouachita NF designated are far more restrictive than State Best Management Practices in terms of allowable silvicultural activities and are applied to all streams with defined channels, not just perennial and intermittent streams.		

Public Concern: Fuels Management

Doc#	Cmt#	Comment
337	177	"The analysis need to address how the timber sale will increase the fire danger...how far a fire could spot and the danger to nearby structures."
Response		
The Forest Fire Managers do not agree that timber sales will increase fire danger. From a fire behavior perspective, changes in fuels resulting from timber harvesting are generally very short-term (no more than a single growing season in regard to fuel loading, arrangement and flammability and resultant fire danger). In the long-term, thinning in older stands as a part of an ecological restoration should significantly reduce the risk of catastrophic fires.		

Miscellaneous

Agency Concern: Heritage Resource Management Plans

Doc#	Cmt#	Comment
12	3	"documentation and results form Sections 106 and 110 work must be fully integrated into Forest Heritage Resource Management Plans for effective planning"
Response		
We agree; this concept has been integrated into the objectives (2005 Revised Forest Plan Part 2) for Heritage Resources.		

Elected Official Concern: Sufficiency of Public Opinion Survey Data Presented

Doc#	Cmt#	Comment
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34	6	"Give people more alternatives to choose from on the surveys. In present form it is very misleading. Such as strongly agree or somewhat agree."
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Response

Additional columns were added in the FEIS to the referenced data tables in order to show more of the range of responses received. (Note: this comment refers to summary data presented in the DEIS concerning a public opinion survey.)

Public Concern: Goals/Messages for Conservation Education

Doc#	Cmt#	Comment
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259	-73	"The goals/messages stated for conservation education seemed vague and could be more specific."
259	74	"The partners sought by the Forest Service, with regard to helping deliver the conservation education message to consumers and taxpayers/voters, could be specified."

Response

The messages needed to be clarified; the desired condition statement for this item has been revised. The Forest Service welcomes all potential partners, and have an ongoing working relationship with the Cradle of Forestry Interpretive Association (headquartered in Asheville, NC). A sample of some of the other organizations that have helped or are helping "deliver the conservation education message" include the Audubon Society (identifying outstanding birding areas on the national forest); The Nature Conservancy (Fire Learning Network); Arkansas Forestry Association (forest practices); and Quail Unlimited, Wild Turkey Federation, Wildlife Society, Fisheries Society, and Wildlife Federation (fish and wildlife habitat). In addition, the Forest often partners with other federal and state agencies to deliver conservation education messages.

Public Comment: Ecologically Sound Land Acquisition

Doc#	Cmt#	Comment
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337	160	"The Forest Service should incorporate an ecologically sound land acquisition and exchange policy in the Forest Plan...essential that external threats to public land be addressed...based on an analysis that emphasizes the protection and long-term viability of ecosystems. Consolidation for the sake of economic operation and maintenance is not sound public policy because it excludes numerous factors from the decision."
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Response

Forest-wide standard LA002 presents ecologically sensitive criteria for landownership adjustments.

Public Concern: Carbon Sequestration and Global Warming

Doc#	Cmt#	Comment
337	163	"The Forest Plan should address the issue of how much carbon is being stored in the forest, and how the actions proposed in the draft plan will release stored carbon...Increases in CO ₂ in the atmosphere are contributing to global climate change, which could have a serious effect on our forests."
337	164	"References which should be considered (and contradict the claims about climate change in the DEIS)..."
375	258	Doc 375 Cmt 258 "The forest plan should address the issue of how much carbon is being stored in the forest, and how the actions proposed in the draft plan will release stored carbon. For example, recent research in the Eastern U.S. have indicated that mature white oak trees store excess carbon in this carbon enriched atmosphere. Forest management activities such as logging, roadbuilding, and burning result in significant carbon release to the environment. Increases in CO ₂ in the atmosphere are contributing to global climate change, which could have a serious effect on our forests. This needs to be considered."
373	233	"...how much that [prescribed burning] contributes to Global Warming and climate change... Global effects are [not] outside the scope of this analysis."

Response

The global nature of this concern is beyond the scope of this EIS. We note, however, that carbon contained in vegetation will ultimately be cycled between atmospheric carbon (CO₂) and terrestrial carbon. One way to delay this process is to harvest the timber and convert it into lumber and other solid wood products and sequester it in constructed buildings, then foster the development of stands of younger trees that generally consume more CO₂ than mature trees. Thus, the Ouachita NF timber sale and reforestation programs support carbon sequestration. While the numerous references cited in Document 337 may be of general scientific interest, they are not specifically related to the Ouachita NF and thus are outside the scope of the information used to support the analysis. The FEIS (Chapter 3, Climate) briefly discusses the prospect that climate change may affect the health, diversity, and productivity of the Ouachita NF.

Comment Letters from Federal, State, and Local Agencies and Elected Officials

Copies of comment letters from Federal, State, and local agencies and elected officials concerning the proposed Revised Forest Plan and Draft Environmental Impact Statement are reproduced on the following pages of this appendix.



Oklahoma Archeological Survey

THE UNIVERSITY OF OKLAHOMA

February 25, 2005

Alan G. Newman
Forest Supervisor
Ouachita National Forest
P. O. Box 1270
Hot Springs, AR 71902

Re: Draft Environmental Impact Statement and Proposed Revised Land and
Resource Management Plan, Ouachita National Forest, Arkansas and Oklahoma.

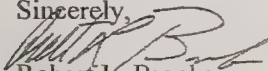
Dear Mr. Newman:

I have reviewed the above referenced document regarding treatment of cultural (heritage) resources. I have no objection to selection of Alternative E as the preferred alternative for revision of the Forest Plan. This alternative combines elements of the various alternative plans with some revisions. As all actions affecting heritage resources from the various alternatives would require treatment under Sections 106 and/or Section 110 of the National Historic Preservation Act, the selection of Alternative E is not anticipated to bring about greater threat to heritage resources.

I am in concurrence with statements made concerning heritage resources in the EIS and Revised Forest Plan. The one comment I have concerns actions taken by the Ouachita National Forest in respect to survey for heritage resources, evaluatory testing of resources for National Register eligibility, as well as data recovery efforts to mediate adverse affects to National Register eligible properties. Reports documenting the nature of this work and resultant findings should be an integral part of the heritage resource program. From my perspective, documentation and results from Sections 106 and 110 work must be fully integrated into Forest Heritage Resource Management Plans for effective planning. Such documentation should also be performed to meet requirements under the Archaeological Resource Protection Act and the Archeological Data Recovery Act.

This review was conducted in cooperation with the State Historic Preservation Office, Oklahoma Historical Society.

Sincerely,


Robert L. Brooks
State Archaeologist

Cc: SHPO
K. Schneider, USFS



March 8, 2005

Forest Plan Team
US Forest Service
P.O. Box 1270
Hot Springs, Ar. 71902

RE: Comments on the Proposed Land and Resource Management Plan

1. Page 8 – D.E.I.S., Alternative E, Relationship to Communities

The forest service should follow through on statements about helping improve economic relationships with communities. In the past this just seemed to be written to simply satisfy our congressional delegation.

Overall the Plan looks good. I think the forest service needs to take the welfare of the communities into account before enacting any new regulations and also contact the County Judge and Quorum Courts of the counties affected.

2. Page 174 –175 – D.E.I.S.

Give people more alternatives to choose from on the surveys. In present form it is very misleading. Such as strongly agree or somewhat agree. This form seems to skew the answers in favor of subject.

3. O.H.V. Use

If plan to limit OHV use to designated trails and roads is adopted, this will do exactly what you are trying to prevent. It will put all use on a limited number of places and cause a higher incidence of erosion on these areas. Instead of having only two or three problem areas, there will be many more.

The way to eliminate the problem is to eliminate the source. Groups of pleasure riders coming in from out of state and county. Restrict these people to hard service roads and trails.

The sportsmen of our county do very little damage to the forest as you have indicated. Don't punish the whole population for what the few do.



At least open up the use during deer seasons, so that the disabled and abled hunters can retrieve their game or tree stands. If not, a higher incident of cardiac arrests could happen. Just with the exhausting effort it takes to drag a deer out.

The hunter would be forced to leave his \$4,000.00 - \$7,000.00 machine on the trail or road when he went into the woods to hunt, leaving it susceptible to vandalism or theft. To pull it off the trail or up in the woods to hide it would be in violation. The groups who ride for pleasure would have no problem staying on designated routes, because that is what they enjoy. They will still get to ride and enjoy their hobby, the hunter won't.

If none of the above is feasible, which I'm sure they won't be, ban OHV's from the forest completely. If going in to retrieve game is going to damage the forest floor, then I think the USFS should abide by the rule also. Manage the forest like you use too (by foot).

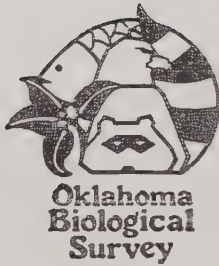
4. Increase Law Enforcement

I am strongly against increasing law enforcement in the national forest. Too many people have had very negative experiences when contacted by USFS personnel. Our county is doing the best we can to build our tourist trade. Don't spoil it with law officers with a bad attitude toward visitors.

I don't think the forest service should be writing traffic tickets to citizens or visitors. We have our state and local officers for that. This not only gives our people a bad experience, it also takes money out of our county.

Thank You,

Ted Elder
Montgomery County Judge



Oklahoma Biological Survey
111 E. Chesapeake Street
University of Oklahoma
Norman, Oklahoma 73019

Telephone (405) 325-4034
FAX (405) 325-7702

25 April 2005

To: Ouachita National Forest

From: Jeff Kelly, Oklahoma Natural Heritage Inventory Zoologist

Subject: Proposed Revised Land and Resource Management Plan

Date: 25 April 2005

I have reviewed the Proposed Revised Land and Resource Management Plan for the Ouachita National Forest. My interest in doing so was to determine which of the proposed management alternatives would provide the best protection and enhancement of the native fauna of Oklahoma. The Environmental Impact Statement presented the ongoing management (alternative A) and four other choices. As is typically true in such complex plans there was no one alternative that contained all of the options that I would support unequivocally. Of those presented, alternative D would appear to be the best compromise for Oklahoma's diverse fauna. This option appears to protect the largest land base in wilderness designations and emphasizes the role of natural processes (fire) in shaping the structure and composition of the forest. It is not clear why fire management is primarily limited to Units 21 and 22. While there is no doubt that this tool is appropriate in these units, it would also seem to be useful in reducing the risk of catastrophic fire; which is the number 1 national strategic goal of the Forest Service. In addition, the emphasis on scenery management, in this and other alternatives, would seem to be short sighted if it detracts from management directed at important ecological attributes of these forests.

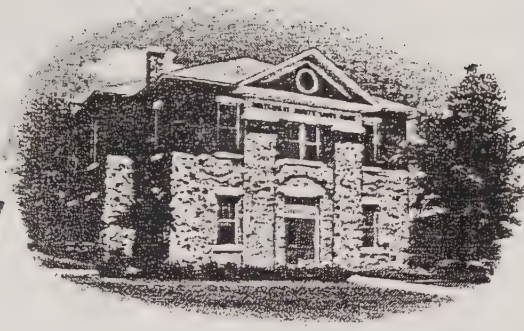
Repeated allusions to the "healthy forests initiative" detracted from my ability to understand what activities would actually take place on the land. As a reviewer, I perceive that the options presented may be overridden substantially by this initiative (e.g., "including any adjustments needed to respond to the Healthy Forests Initiative"). If this is the case, it would seem to contradict the spirit of the planning exercise in which local feedback is used to shape forest management. This sort of politically driven rhetoric does not improve a stakeholder's confidence that their contribute to the planning process is taken seriously.

Constituent Programs:

Bebb Herbarium * Oklahoma Fishery Research Laboratory * Oklahoma Natural Heritage Inventory *
Sutton Avian Research Center

MONTGOMERY COUNTY

*Ted Elder
County Judge*



MOUNT IDA, ARKANS

May 2, 2005

Alan Newman, ONF Supervisor
Alett Little, Team Leader Revision Plan
P. O. Box 1270
Hot Springs, AR 71902

Dear Mr. Newman & Ms. Little

Because 76% of Montgomery County is National Forest, decisions changing the management plan for the Ouachita National Forest could have a major affect on the citizens and economy of the county. Here are some specific comments the Montgomery County Quorum Court have to the proposed Land and Resource Management Plan.

Many families in Montgomery County earn their living by working in the timber industry. Logging has been a tradition handed down through generations of families and it is important to maintain those traditions for the future. We encourage the Forest Service to develop small sales in the timber harvest area. All loggers, large and small, have a right to bid on a tract of timber. When our logging families are working, they add greatly to the economy of the county. The Forest Service should try to work with the local communities and try to divide some of the timber tracts so that smaller logging operations can afford to place a bid on the timber. This is an important part of maintaining the economic stability of our local communities. We realize that administrative costs may be a little more but this action could double public relations with the citizens.

Prescribed burning is an important aspect of managing the national forest. Safety is of utmost importance for all the citizens and visitors in Montgomery County. We support the increase in prescribed burning to reduce the fuel buildup which could cause major wildfires as we have seen out west. The public needs to be able to enjoy the national forest without having to worry about being in a fire danger zone. Our homes and businesses can be much better protected when high fuels levels have been eliminated.

Thinning of timber gives the trees a better chance to grow and creates a healthier forest. We support an increase in the thinning process and we all need to be reminded that timber

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is a renewable resource. A healthy forest gives people more jobs and provides opportunity for recreation.

Open road access is a very important aspect of the management plan. Maintenance should be used as efficiently as possible to keep as many roads open as possible. Roads are a vital part of the economy of Montgomery County. Forest Service roads and roads provide a network of access to most parts of the national forest within the Revisions to the management plan that close this access will stifle the economic and the opportunity for use by the citizens and visitors to the county as well. Many citizens work in the national forest and enjoy the recreational opportunities provided by the national forest and must have open roads to do these things. Emergency personnel must be able to get to an accident. Even forest service personnel must have access to survey timber stands for management purposes and checking timber health. The purpose of the national forest is for multiple use.

The use of ATV's has become part of the culture of many citizens of Montgomery County. Grouping four-wheelers together such as Wolf Pen Gap has created many problems. The Ouachita National Forest has many roads and trails which could be used by an ATV rider. The more roads and trails accessible to four-wheelers the less damage they would be on the environment. We support the continued use of ATV's within the county. We do not support regulations that violate individual rights.

The citizens of Montgomery County and the general public all want a Healthy Forest. Education and communication are an important aspect in working together to solve problems and determine what is best for the local communities and their citizens. We take a lot of planning and studying to determine what is the best management for the national forest. Montgomery County has a land use plan which describes our culture and the National Environmental Policy Act mandates that our local culture be considered when making proposals which may affect the livelihoods of citizens and the economy of the county.

We want to keep the wonderful county where we live and a healthy forest, clean water and work and enjoy our national forest by supporting the Forest Service in doing what we were established to do--manage the national forest. We must work together all of us one another to achieve these goals. We hope that our comments are helpful to the revision plan.

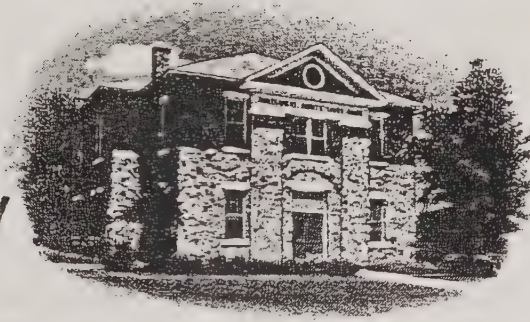
Sincerely



Montgomery County Quorum Court

MONTGOMERY COUNTY

*Ted Elder
County Judge*



MOUNT IDA, ARKANSAS 71957

May 2, 2005

Alan Newman, ONF Supervisor
Aleth Little, Team Leader Revision Plan
P. O. Box 1270
Hot Springs, AR 71902

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Prescribed burning is an important aspect of managing the national forest. Safety is of utmost importance for all the citizens and visitors in Montgomery County. We support the increase in prescribed burning to reduce the fuel buildup which could cause major wildfires as we have seen out west. The public needs to be able to enjoy the national forest without having to worry about being in a fire danger zone. Our homes and businesses can be much better protected when high fuels levels have been eliminated.

Thinning of timber gives the trees a better chance to grow and creates a healthier forest. We support an increase in the thinning process and we all need to be reminded that timber

is a renewable resource. A healthy forest gives people more jobs and provides more opportunity for recreation.


Open road access is a very important aspect of the management plan. Maintenance funds should be used as efficiently as possible to keep as many roads open as possible. Roads are a vital part of the economy of Montgomery County. Forest Service roads and county roads provide a network of access to most parts of the national forest within the county. Revisions to the management plan that close this access will stifle the economic growth and the opportunity for use by the citizens and visitors to the county as well. Many citizens work in the national forest and enjoy the recreational opportunities provided by the national forest and must have open roads to do these things. Emergency personnel must be able to get to an accident. Even forest service personnel must have access to survey timber stands for management purposes and checking timber health. The purpose of the national forest is for multiple use.

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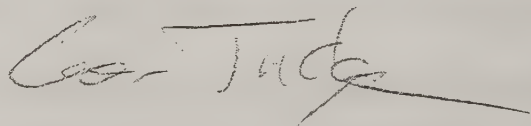
The citizens of Montgomery County and the general public all want a Healthy Forest. Education and communication are an important aspect in working together to solve problems and determine what is best for the local communities and their citizens. It does take a lot of planning and studying to determine what is the best management for a national forest. Montgomery County has a land use plan which describes our custom and culture and the National Environmental Policy Act mandates that our local customs and culture be considered when making proposals which may affect the livelihoods of the citizens and the economy of the county.

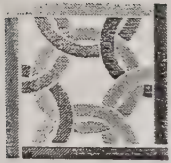
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Sincerely



Montgomery County Quorum Court





The Department of Arkansas Heritage

Mike Huckabee, Governor
Cathie Matthews, Director

Arkansas Arts Council

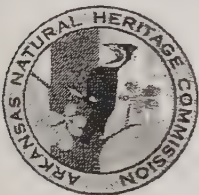
Arkansas Historic
Preservation Program

Delta Cultural Center

Historic Arkansas Museum

Mosaic Templars
Cultural Center

Old State House Museum



Arkansas Natural Heritage Commission

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323 Center Street
Little Rock, AR 72201
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e-mail: info@arkansasheritage.org
website:

<http://naturalheritage.com>

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Date: May 17, 2005
Subject: Proposed Revised Forest Plan
Draft Environmental Impact Statement
Ouachita National Forest
ANHC No.: F-USFS-05-015

Mr. Alan Newman, Forest Supervisor
Ouachita National Forest
P.O. Box 1270
Hot Springs, AR 71902

Dear Mr. Newman:

Staff members of the Arkansas Natural Heritage Commission have reviewed the Proposed Revised Forest Plan and Draft Environmental Impact Statement (DEIS). Overall we think the plan addresses Ouachita National Forest (ONF) management issues very thoroughly and in particular supports its emphasis on appropriate restoration and management of the full range of natural communities and species that occur on the national forest. We have the following specific comments on the plan:

- We believe the increase in number of acres treated with prescribed fire is well justified by the analyses and figures presented on pp. 10-18.
- As we discussed in our meeting with the ONF on March 3, 2005, we believe an addition to South Fourche Special Interest Area (SIA) is warranted. Between the two existing units of this SIA is an abandoned channel of South Fourche LaFave River, elevated considerably above the level of the existing channel. It is kept moist by local surface and groundwater seepage. Plant communities and species typical of the West Gulf Coastal Plain occur there, such as native (not planted) loblolly pine, and wax myrtle. Because of the plant species rare to the Ouachita Mountain Ecoregion that occur in this wetland and the adjacent shale and sandstone glades, the area might be designated as a botanical area. We would be happy to assist you in documenting and developing boundaries for this area.
- We support the designation of 11 Semi-Primitive Areas, Management Area 17 (p. 39). As stated on that page, "Management is dictated by recreational and wildlife objectives that provide for a semi-primitive experience and range of wildlife habitat. In a portion of this Management Area [56,773 acres], most timber harvesting and road construction are deferred for the planning period..." It appears to us that these areas are de facto natural areas, and we would like to participate in evaluation of their natural values and possible management strategies necessary to restore and maintain those values.
- We believe that the plan for old growth restoration (pine-grass emphasis), Management Area 21 (p. 44), will result in an outstanding system of areas representative of the late seral condition of this ecosystem. Likewise Management Area 22, Renewal of the Shortleaf Pine – Bluestem Ecosystem and Red-cockaded Woodpecker Habitat, will continue the stunning progress you have made in restoring the RCW population in the Ouachita Mountains. We note that this ecosystem restoration includes a substantial area over and above that originally proposed for RCW habitat management areas, with an eventual goal of 350,000 acres of shortleaf pine – bluestem habitat by 2021 and we applaud this addition.
- We would like to participate in identification of old growth patches and evaluation of efforts to conserve or enhance their old growth characteristics (p.76).
- We support the proactive and appropriate management of Rare Upland Communities (Management Areas 6, p. 34) and would like to participate in identification and development of management plans for these areas. However, we believe that, with appropriate restoration and management, two of these, Ouachita Dry Oak Woodland

and Ouachita Mesic Hardwood Forest, will become common on the ONF and will not need to be given special attention.

We believe the Land and Resource Management Plan as proposed here will provide excellent direction for management of the Ouachita National Forest for the future. We are looking forward to working with you as you continue to implement this plan.

Sincerely,

Jennifer Sheehan
for:

Thomas Foti
Chief of Research



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6

1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

MAY 20 2005

Robert T. Jacobs
Regional Forester
USDA Forest Service
Southern Region
1720 Peachtree Road, NW
Atlanta, GA 30367

Dear Mr. Jacobs:

In accordance with our responsibilities under Section 309 of the Clean Air Act, the National Environmental Policy Act (NEPA), and the Council on Environmental Quality Regulations for Implementing NEPA, the U.S. Environmental Protection Agency (EPA) Region 6 office in Dallas, Texas, has completed its review of the Draft Environmental Impact Statement (DEIS) for the proposed Ouachita National Forest Revised Land and Resource Management Plan.

EPA classified your DEIS and proposed action as "LO," i.e., EPA has "Lack of Objections". The DEIS is consistent with the CEQ regulations for implementing NEPA. Alternative E is the preferred alternative. This alternative would be a greater emphasis on active management for ecological conditions to sustain diversity and forest health in the Pine-Oak Forest, Pine-Oak Woodland, Shoitleaf Pine/Bluestem Grass Woodland, West Gulf Coastal Plain Pine-Hardwood Forest, and Ouachita Dry to Mesic Oak Forest.

Our classification will be published in the Federal Register according to our responsibility under Section 309 of the Clean Air Act to inform the public of our views on proposed Federal actions. If you have any questions, please contact Michael Jansky of my staff at 214-665-7451 or by e-mail at jansky.michael@epa.gov for assistance.

Sincerely yours,

Rhonda M. Smith
Acting Chief, Office of Planning
and Coordination

Internet Address (URL) • <http://www.epa.gov>

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May 24, 2005

Mr. Alan G. Newman
Forest Supervisor
Ouachita National Forest
P.O. Box 1270
Hot Springs, AR 71902

Dear Mr. Newman

We, as partners in the stewardship and management of natural resources in Arkansas and Oklahoma, wish to speak with one voice on a number of forest wide management issues along with specific items related to the revision of the Ouachita National Forest Land and Resource Management Plan (LRMP). After review of the draft LRMP and its supporting Environmental Impact Statement (EIS), it is clear that the documents are based on best available science, including a diverse land management perspective. The vision statement developed for these documents speaks directly to ecosystem health and sustainability, and this theme remains consistent throughout the documents. Your planning team is to be commended for developing plans in a spirit of cooperation and always showing willingness to consider diverse points of view. We will offer comments on these documents at two levels: forest wide management issues and specific items within the draft plan.

It is our understanding that although you are completing the plan revision under the 1982 planning regulations, you are incorporating the spirit of the new planning process. Monitoring, adaptive management, and collaboration with other agencies are guiding principles in the new process. We see these principles embraced in the documents and again thank you for the partnerships forged throughout development of the revised plan. We understand an Ecological Management System (EMS) for the Ouachita National Forest will be prepared within the next three years. This document will further transition the forest to the new planning process. We share a common interest in insuring ecological health and sustainability of the terrestrial, riparian, and aquatic ecosystems of the Ouachita highlands and wish to work with you in developing the Ouachita EMS.

We wish to express our thanks for the opportunity along with other conservation partners to be actively involved in developing the species viability evaluation (SVE) database for the Ouachita National Forest. This conservation planning tool will help insure diversity and sustainability of biological resources. We know you are completing development of the SVE, and we look forward to working with you in the immediate future specifically to finish tasks related to the fine filter strategy.

Forest Service Chief Dale Bosworth has identified four important threats to America's National Forests. He has stated that wildfire and fuels accumulations, invasive species, land conversion in the context of the urban interface, and

unmanaged recreational use are issues which must be addressed by the national forests during plan revision. We agree with the Chief's assessment and acknowledge that these issues have been addressed and carried through in development of the revised plan.

Forest Wide Comments

We appreciate your ecosystems based approach to plan revision. The detailed descriptions of current and desired ecological condition of terrestrial and aquatic ecosystems within the planning document serve as reference for the development of alternatives. This foundation speaks specifically to maintaining or improving health and sustainability of these ecosystems.

We collectively agree with and support you in identifying Alternative E as the preferred alternative. Alternative E addresses threats to the Ouachita National Forest and provides a balance of ensuring ecosystem health and sustainability along with the social and economic values related to multiple use. In doing so it recognizes human influences, needs, and uses.

With respect to recreation and public access, your revised plan demonstrates a recognition of our concern that these uses should comply first with overall resource conservation, health, and public safety with the realization that there are levels of use the forest cannot provide. It is our understanding that implementation of the new national off highway vehicle policy will eliminate all terrain vehicle (ATV) access to the general forest area and define permitted areas where ATV's may be used. We agree with and support this policy change. We also understand that this change will not be implemented until analysis and identification of roads and trails approved for ATV use has been accomplished. When identifying designated ATV use areas, we ask that you consider designation to the extent possible on existing roads and trails, avoiding riparian areas, and limit the amount of new road or trail construction. We will assist you with analysis, planning and sharing information on the need for these changes in traditional public access and use.

We think a more complete description of what is meant by road decommissioning is needed in the glossary, and we encourage you to place emphasis on decommissioning un-needed roads and trails within riparian ecosystems. Decommissioning and or closure of roads and trails identified as contributors to stream bank instability, sources of elevated sediment input, or as barriers to movement of important riparian and aquatic species will make significant contributions to aquatic and riparian ecosystem health.

Recreational disturbance, potential for soil erosion and related water quality concerns, combined with insufficient maintenance budgets, all speak to the need to reduce existing open road densities on portions of the forest. We commend you for carrying forward the road density objective of one mile of open forest road per square mile of general forest area into the revised forest plan.

When planning road closures, we recommend the increased use of gates with information signs and reduced use of earthen mounds as road closure devices. Experience has shown that gates are more effective than earthen mounds for road closure. We also support the increased use of seasonal road closures to balance resource management objectives while providing access during high demand periods.

When considering new recreational developments, we ask you to place emphasis on low impact uses where no threats to sensitive flora, fauna, or archaeological resources are present. Some examples of low impact recreation include hiking, hunting, fishing, mountain bicycling, rock climbing, wildlife observation, and geocaching.

We are pleased with the overall direction developed for water and riparian communities (Management Area 9). It shows a high priority has been placed on riparian and aquatic health. You should retain all of the tools necessary to maintain or restore these ecosystems and not limit your options for invasive species control.

The ability to use selective thinning, and in specific instances conversion of single species plantations to more appropriate riparian forest assemblages, should be retained. Application of herbicides approved for aquatic use may be needed to control invasive species now threatening native vegetation adjacent to stream courses. Restoration of native cane stands on appropriate sites also should be planned and emphasized where ecologically appropriate.

Oak decline is a serious management challenge facing portions of the Ouachita National Forest. Healthy white oaks will live 250-300 years, and healthy red oaks will live 120-150 years. Droughts and native insects like the red oak borer have been part of Ouachita oak ecosystems for several millennia and these forces have historically thinned woodlands in synergy with fire. Some oak forests have become so dense that competition for water, light and nutrients is intense. Where previously forest densities ranged around 50 stems per acre, there may now be over 150 stems per acre, each depending upon the same levels of water, nutrients and light. Due to this increase in forest density, the current forest is under excessive stress and vulnerable to stochastic events at scales outside the historical range of variability.

Recent droughts have been within the historical range of variation. Records indicate that more severe droughts lasting up to ten years have occurred in recent history without extensive oak mortality. The current overstocked forest may appear healthy during non-drought years, but is nevertheless stressed. Current outbreaks of insects and pathogens are not a result of drought, but rather the symptoms of a stressed ecosystem incapable of sustaining itself under altered conditions. In addressing oak decline, it should be recognized that overly dense forest stands, caused to a large degree by the lack of fire, has contributed to the current unhealthy forest condition.

We believe the plans for oak-hickory ecosystem restoration developed and in use on demonstration sites of the South Central Fire Learning Network could be applied to

additional sites in the Ouachita National Forest. Information from participating sites appropriate for inclusion into the final revised plan can be found at <http://the-ecomangement.org/Fire/>. We will work with you to further refine your plans to address oak decline and restore oak-hickory ecosystems.

For several thousand years prior to European settlement, the Ouachita Highlands like other parts of central North America were influenced by natural processes and Native American lifestyles, including frequent burning done for a variety of purposes. Fire and cultural disturbances are essential ecological processes throughout the Ouachitas.

The average annual prescribed burning and the seasonal diversity of burns, dormant and growing season, planned in alternative E should be adequate to accomplish forest wide fuel reduction, ecological diversity and restoration, and wildlife habitat objectives. Increased monitoring of the expanded burn program should be emphasized to quantify efficacy of treatments against objectives.

Expanded prescribed fire objectives will result in challenges related to increased human-smoke conflicts. Adaptive management mechanisms should be incorporated into the prescribed burning program, with adjustments made based on the results of monitoring. If through monitoring and the best science you learn that planned burn acres need to be adjusted up or down, you should incorporate into the final plan the latitude to adjust without having to revise the plan. You also should plan for increased public education and information on the role of fire as a management tool for ensuring forest health and sustainability.

Fire alone will not remedy years of suppression and forest densification. The revised plan does not go far enough in detailing plans for oak dominated forest management. Management prescriptions which include commercial and non-commercial thinning of over stocked oak dominated forest types must be discussed within the framework of the plan in order to ensure sustainability of these ecosystems.

The Ouachita National Forest is a national center of excellence in restoring shortleaf pine-bluestem woodland and savanna ecosystems. We commend you for placing proper emphasis on this initiative and agree with the amount and distribution of shortleaf pine woodland and savanna shown in Management Areas 21 and 22. We also believe you have designed adequate flexibility within management area 14 to implement shortleaf woodland and savanna restoration, and as appropriate areas are identified we encourage you to further expand restoration of these productive and diverse ecosystems. Because of the potential for selective grazing to interfere with the restoration of the bluestem component of the ecosystems, we recommend that impact of grazing in Management Areas 21 and 22 be closely monitored.

Where grazing is currently allowed, we ask you to continue to control livestock numbers and mitigate negative effects to restore, enhance, or maintain the integrity of stream channels and banks. We also ask that as interest in the use of existing

woodland allotments diminishes or if range conditions indicate that you place priority on phasing out woodland grazing permits.

A number of introduced species are invasive and threaten the native ecosystems of the Ouachita National Forest. We agree with and support your planning direction for reducing invasive species impacts and avoiding additional introductions of exotics. It will be essential to retain the use of approved herbicides to effectively control unwanted species such as *Sericea lespedeza* and fescue. We agree with your description of adverse effects caused by the imported red fire ant and encourage you to place high priority on monitoring and treatment to detect further increases in the numbers of this insect pest. We also encourage you to develop planning direction for preemptive site specific fire ant control, although this objective should receive a lower priority than management of invasive plant species.

SPECIFIC COMMENTS, PROPOSED REVISED LAND AND RESOURCE MANAGEMENT PLAN

(Page 61, OBJ02) Aggressive and proactive preventative and control measures will reduce the long term costs associated with curtailing the spread of invasive native and non-native species. The planned annual treatment is 200 acres forest wide, but we believe there is a much greater need for such treatments and would ask that you not consider 200 acres as the maximum annual treatment acres. Rather than suggest a larger acreage, we ask an allowance for flexibility to treat acres identified within budget constraints. This will be especially important for control of *Sericea lespedeza* as the canopy is thinned and more prescribed fire is used throughout various management areas on the forest.

(Page 62, OBJ09) We strongly support a higher priority placed on conversion to native species and would like to see more than 500 acres annually treated. If this is not possible, we recommend you place emphasis on initial allocation of these acres to Oklahoma portions of the national forest within existing range allotments. This will provide an increased forage base away from sensitive streams and riparian areas and reduce the streamside grazing pressure identified on some of the Oklahoma range allotments.

(Page 84, HU003) Please add the following text. "Broadcast application should be used only for noxious weed eradication/control programs, not for general forestry work."

(Page 90, Livestock Grazing, LG002) We would like to see text added which would specify that allotment plans include forage improvements by way of thinning and prescribed burning along with development of small ponds as livestock water sources, and conversion of off-site loblolly pine plantations. This will divert grazing away from wild and scenic river corridors and minimize access to all other stream areas.

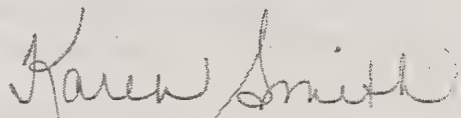
(Page 90, Livestock Grazing) We recommend you add language and/or standards which will address the following concerns related to grazing:

If you have improved pasture systems in non-native forage species such as fescue or Bermuda grass we ask that you add language or standards that would plan for conversion to native forage grasses. No new non-native plantings should be allowed. Feeding troughs or water troughs should not be placed in riparian areas. Salt blocks and mineral blocks should be placed in boxes or containers to control leaching into soils and should be placed in areas which will encourage grazing away from riparian zones.

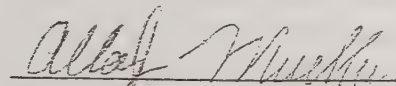
In closing we once again commend your staff for a job well done. The draft documents address the four imminent threats identified by Chief Bosworth and the planning team has done an excellent job of bringing these threats to the forefront throughout the draft documents. We are available to assist you with completing remaining tasks and remain united in our support of your ecologically responsible land management.



Scott Simon, State Director
Arkansas Field Office,
The Nature Conservancy



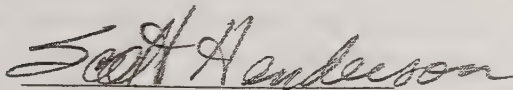
Karen Smith, Director
AR Natural Heritage Commission



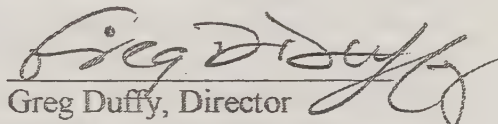
Allan J. Mueller, Field Supervisor
Arkansas Field Office
U.S. Fish and Wildlife Service



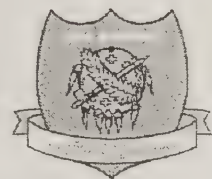
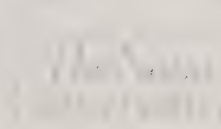
Jerry Brabander, Field Supervisor
Oklahoma Field Office
U.S. Fish and Wildlife Service



Scott Henderson, Director
AR Game and Fish Commission



Greg Duffy, Director
OK Dept. of Wildlife Conservation





J. Randy Young, PE
Executive Director

Arkansas Soil & Water Conservation Commission

101 East Capitol, Suite 350
Little Rock, Arkansas 72201
<http://www.aswcc.arkansas.gov>

Phone: (501) 682-1611
Fax: (501) 682-3991
E-mail: aswcc@arkansas.gov



Mike Huckabee
Governor

MEMORANDUM

RECEIVED

MAY 24 2005

INTERGOVERNMENTAL
SERVICES
STATE CLEARINGHOUSE

TO: Mr. Tracy Copeland, Manager
State Clearinghouse

FROM: Mr. J. Randy Young, P.E.
Executive Director

SUBJECT: Summary Draft Environmental Impact Statement and Proposed Revised
Land and Management Plan - Ouachita National Forest
Arkansas and Oklahoma - Forest Service Southern Region

DATE: May 23, 2005

Members of the Technical Review Committee have reviewed the above referenced project; the Forest Service proposes to revise the Land and Resource Management Plan (Forest Plan) for the Ouachita National Forest. The Forest Plan provides long-term, strategic direction for natural resource management of the Forest. Projects designed to implement the direction of the Forest Plan are undertaken only after additional, project-specific environmental consideration. The Forest Service published the Amended Forest Plan for the Ouachita National Forest in 1990, replacing the 1986 Forest Plan, and the Amended Forest Plan will be 15 years old in March 2005. Part of the need to revise the Forest Plan is that the National Forest Management Act calls for such plans to be revised every 10-15 years. The need to revise the Forest Plan is also driven by the changing conditions identified in the Ozark-Ouachita Highlands Assessment, the Southern Forest Resource Assessment, and ongoing monitoring and evaluation results specific to the Ouachita National Forest. In developing a Forest Plan, the Forest Service examines various alternatives to reach a final decision about the future management of the given National Forest. The Draft provides a detailed analysis of alternatives for management of the Ouachita National Forest. Five alternatives were analyzed. Under the preferred alternative, the revised Forest Plan would allocate land to 17 management areas and recommend increases to Flatside Wilderness and Upper Kiamichi Wilderness. The alternatives examined in detail include the current Forest Plan and four alternatives that present a range of projected vegetation management activates and wilderness recommendations. The Committee supports this project. Comments are attached for your review.

The opportunity to comment is appreciated.

JRY/ddavis

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STATE OF ARKANSAS

OFFICE OF INTERGOVERNMENTAL SERVICES

Department of Finance
and Administration

1515 West Seventh Street, Suite 412
Post Office Box 8031
Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
<http://www.state.ar.us/dfa>

MEMORANDUM

TO: All Technical Review Committee Members *#1776*
FROM: Tracy L. Copeland, Manager *TLC* State Clearinghouse
DATE: February *23* 2005
SUBJECT: SUMMARY DRAFT ENVIROMENTAL IMPACT STATEMENT & PROPOSED REVISED
LAND AND MANAGEMENT PLAN-OUACHITA NATIONAL FOREST
ARKANSAS AND OKLAHOMA-FOREST SERVICE SOUTHERN REGION

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

March *15* 2005

Your comments should be returned by _____ to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

If you have no reply within that time we will assume you have no comments and will proceed with the sign-off.

NOTE: It is Imperative that your response be in to the ASWCC office by the date requested. Should your Agency anticipate having a response which will be delayed beyond the stated deadline for comments, please contact Ms. Debby Davis of the ASWCC at (501) 682-1611 or the State Clearinghouse Office.

_____ Support _____ Do Not Support (Comments Attached)
_____ Comments Attached _____ Support with Following Conditions
☒ No Comments _____ Non-Degradation Certification Issues
(Applies to ADEQ Only)

Name(print) *Colbert* Agency *ASWCC* Date *5/17/05*
Telephone Number _____



STATE OF ARKANSAS

Department of Finance and Administration

B.S.
OFFICE OF INTERGOVERNMENTAL SERVICE

1515 West Seventh Street, Suite 41
Post Office Box 803
Little Rock, Arkansas 72203-803
Phone: (501) 682-107
Fax: (501) 682-520
<http://www.state.ar.us/df>

MEMORANDUM

Received RECEIVED

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager *THC* State Clearinghouse

DATE: February ²³ ~~17~~, 2005

SUBJECT: SUMMARY DRAFT ENVIROMENTAL IMPACT STATEMENT & PROPOSED REVISED
LAND AND MANAGEMENT PLAN-OUACHITA NATIONAL FOREST
ARKANSAS AND OKLAHOMA-FOREST SERVICE SOUTHERN REGION

FEB 25 2005 FEB 24 2005
River Basins Directors Office

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

¹⁵
March ~~10~~, 2005

Your comments should be returned by _____ to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

If you have no reply within that time we will assume you have no comments and will proceed with the sign-off.

NOTE: It is imperative that your response be in to the ASWCC office by the date requested. Should your Agency anticipate having a response which will be delayed beyond the stated deadline for comments, please contact Ms. Debby Davis of the ASWCC at (501) 682-1611 or the State Clearinghouse Office.

_____ Support _____ Do Not Support (Comments Attached)

_____ Comments Attached _____ Support with Following Conditions

_____ No Comments _____ Non-Degradation Certification Issues
(Applies to ADEQ Only)

OUR comments will be provided at the Final level.

Name(print) _____ Agency _____ Date _____

Telephone Number _____

RECEIVED
FEB 24 2005
AR 541
OFFICE OF INTERGOVERNMENTAL SERVICE



STATE OF ARKANSAS

OFFICE OF INTERGOVERNMENTAL SERVICES

Department of Finance and Administration

1515 West Seventh Street, Suite 412
Post Office Box 8031
Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
<http://www.state.ar.us/ofa>

MEMORANDUM

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager ^{TRC} State Clearinghouse

DATE: February ²³ 2005

SUBJECT: SUMMARY DRAFT ENVIROMENTAL IMPACT STATEMENT & PROPOSED REVISED
LAND AND MANAGEMENT PLAN-OUACHITA NATIONAL FOREST
ARKANSAS AND OKLAHOMA-FOREST SERVICE SOUTHERN REGION

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March ¹⁵ 2005

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NOTE: It is imperative that your response be in to the ASWCC office by the date requested. Should your Agency anticipate having a response which will be delayed beyond the stated deadline for comments, please contact Ms. Debbv Davis of the ASWCC at (501) 682-1611 or the State Clearinghouse Office.

<input type="checkbox"/> Support	<input type="checkbox"/> Do Not Support (Comments Attached)
<input type="checkbox"/> Comments Attached	<input type="checkbox"/> Support with Following Conditions
<input checked="" type="checkbox"/> No Comments	<input type="checkbox"/> Non-Degradation Certification Issues (Applies to ADEQ Only)

RECEIVED
05 MAR -1 AM 9:11
SOIL & WATER COMM.

Name(print) JERRY BRADSHAW Agency COSL Date 3/1/03
Telephone Number 683-3310



STATE OF ARKANSAS

Department of Finance and Administration

OFFICE OF INTERGOVERNMENTAL SERVICES

4515 West Seventh Street, Suite 412
Post Office Box 8031
Little Rock, Arkansas 72203-8031
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Fax: (501) 682-5206
<http://www.state.ar.us/dfa>

MEMORANDUM

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager ~~State Clearinghouse~~ *HC*

DATE: February ~~17~~ ²³ 2005

SUBJECT: SUMMARY DRAFT ENVIRONMENTAL IMPACT STATEMENT & PROPOSED REVISED
LAND AND MANAGEMENT PLAN-OUACHITA NATIONAL FOREST
ARKANSAS AND OKLAHOMA-FOREST SERVICE SOUTHERN REGION

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

March ~~16~~ ¹⁵ 2005

Your comments should be returned by _____ to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

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NOTE: It is imperative that your response be in to the ASWCC office by the date requested.
Should your Agency anticipate having a response which will be delayed beyond the
stated deadline for comments, please contact Ms. Debby Davis of the ASWCC at
(501) 682-1611 or the State Clearinghouse Office.

<input type="checkbox"/> Support	<input type="checkbox"/> Do Not Support (Comments Attached)
<input type="checkbox"/> Comments Attached	<input type="checkbox"/> Support with Following Conditions
<input checked="" type="checkbox"/> No Comments	<input type="checkbox"/> Non-Degradation Certification Issues (Applies to ADEQ Only)

RECEIVED
05 MAR -9 AM 11:31
SOIL & WATER COM.

Name(print) Harold Seifert *HC* Agency Division of Engineering Date 03/04/05
Telephone Number 501-661-2623 Arkansas Department of Health
4815 West Markham
Little Rock, AR 72205-3867



STATE OF ARKANSAS

OFFICE OF INTERGOVERNMENTAL SERVICES

Department of Finance and Administration

1515 West Seventh Street, Suite 412
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Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
<http://www.state.ar.us/dfa>

MEMORANDUM

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager ^{THC} State Clearinghouse

DATE: February ²³~~17~~, 2005

SUBJECT: SUMMARY DRAFT ENVIROMENTAL IMPACT STATEMENT & PROPOSED REVISED
LAND AND MANAGEMENT PLAN-OUACHITA NATIONAL FOREST
ARKANSAS AND OKLAHOMA-FOREST SERVICE SOUTHERN REGION

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

March ¹⁵~~10~~, 2005

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_____ Support _____ Do Not Support (Comments Attached)

_____ Comments Attached _____ Support with Following Conditions

_____ No Comments _____ Non-Degradation Certification Issues
(Applies to ADEQ Only)

Name(print) BILL PRIOR Agency AGC Date 2-28-05

Telephone Number 663-0117

RECEIVED
05 MAR -21 AM 9:22
SOIL & WATER CONSERVATION



Arkansas GEOLOGICAL COMMISSION

VARDELLE PARHAM GEOLOGY CENTER • 3815 WEST ROOSEVELT ROAD • LITTLE ROCK, ARKANSAS 72204

Mike Huckabee
Governor
Bekki White
Director and State Geologist

February 25, 2005

Mr. Randy Young
Chairman, Technical Review Committee
101 E. Capitol, Suite 350
Little Rock, Arkansas 72203

Dear Mr. Young:

This letter is a response to your request for comments on the proposed Land Management Plan for the Ouachita National Forest in Arkansas and Oklahoma by the U.S. Forest Service. Most all of the plan's proposals deal with biological and social issues therefore I will have no comments to make on them.

The only geological mention made is on page 13 under Area 5, Experimental Forests. This section is precluding all mineral exploration and development in these areas. Also does the term (lease able minerals) apply to fossil fuels? Other than this question I have no other comments.

Sincerely,

William Lee Prior
Geologist Supervisor

PHONE: (501) 296-1877; FAX: (501) 663-7360
egc@arkansas.gov
www.state.ar.us/egc/egc.htm
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STATE OF ARKANSAS

OFFICE OF INTERGOVERNMENTAL SERVICES

Department of Finance and Administration

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Post Office Box 8031
Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
<http://www.state.ar.us/dfa>

MEMORANDUM

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager ^{THC} State Clearinghouse

DATE: February ~~12~~²³ 2005

SUBJECT: SUMMARY DRAFT ENVIROMENTAL IMPACT STATEMENT & PROPOSED REVISED
LAND AND MANAGEMENT PLAN-OUACHITA NATIONAL FOREST
ARKANSAS AND OKLAHOMA-FOREST SERVICE SOUTHERN REGION

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

March ~~16~~¹⁵ 2005

Your comments should be returned by _____ to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

If you have no reply within that time we will assume you have no comments and will proceed with the sign-off.

NOTE: It is imperative that your response be in to the ASWCC office by the date requested. Should your Agency anticipate having a response which will be delayed beyond the stated deadline for comments, please contact Ms. Debby Davis of the ASWCC at (501) 682-1611 or the State Clearinghouse Office.

_____ Support _____ Do Not Support (Comments Attached)

_____ Comments Attached _____ Support with Following Conditions

 No Comments _____ Non-Degradation Certification Issues
(Applies to ADEQ Only)

Name(print) Steve Jones Agency ADEQ Date 2-24-05

Telephone Number 501-682-7311

5-37



STATE OF ARKANSAS

Department of Finance
and Administration

FEB 25 2005

Outdoor
Recreation Grants

MEMORANDUM

OFFICE OF INTERGOVERNMENTAL SERVICES

RECEIVED

FEB 24 2005

Outdoor
Recreation Grants

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RECEIVED

FEB 24 2005

EXECUTIVE DIRECTOR'S
OFFICE

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager ~~State Clearinghouse~~

DATE: February ²³~~22~~ 2005

SUBJECT: SUMMARY DRAFT ENVIROMENTAL IMPACT STATEMENT & PROPOSED REVISED
LAND AND MANAGEMENT PLAN-OUACHITA NATIONAL FOREST
ARKANSAS AND OKLAHOMA-FOREST SERVICE SOUTHERN REGION

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March ¹⁵~~19~~ 2005

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stated deadline for comments, please contact Ms. Debby Davis of the ASWCC at
(501) 682-1611 or the State Clearinghouse Office.

_____ Support _____ Do Not Support (Comments Attached)

_____ Comments Attached _____ Support with Following Conditions

☒ No Comments _____ Non-Degradation Certification Issues
(Applies to ADEQ Only)

Name(print) A. Chouinard Agency RDFT Date 3/7/05

Telephone Number 501-682-6946



STATE OF ARKANSAS

OFFICE OF INTERGOVERNMENTAL SERVICES

Department of Finance
and Administration

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Post Office Box 8031
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Fax: (501) 682-5206
<http://www.state.ar.us/dfa>

MEMORANDUM

TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager ^{TLC} State Clearinghouse

DATE: February ²³ 2005

SUBJECT: SUMMARY DRAFT ENVIRONMENTAL IMPACT STATEMENT & PROPOSED REVISED
LAND AND MANAGEMENT PLAN-OUACHITA NATIONAL FOREST
ARKANSAS AND OKLAHOMA-FOREST SERVICE SOUTHERN REGION

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

March ¹⁵ 2005

Your comments should be returned by _____ to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

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☒ Support ☐ Do Not Support (Comments Attached)

☐ Comments Attached ☐ Support with Following Conditions

☐ No Comments ☐ Non-Degradation Certification Issues
(Applies to ADEQ Only)

Name(print) George Rheinhardt Agency AFC Date 2-28-05

Telephone Number 296-1861



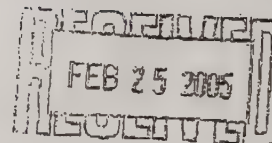
STATE OF ARKANSAS

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Little Rock, Arkansas 72203-8031
Phone: (501) 682-1074
Fax: (501) 682-5206
<http://www.state.ar.us/dfa>

MEMORANDUM



TO: All Technical Review Committee Members

FROM: Tracy L. Copeland, Manager ^{TC} State Clearinghouse

DATE: February ²³ ~~17~~ 2005

SUBJECT: SUMMARY DRAFT ENVIROMENTAL IMPACT STATEMENT & PROPOSED REVISED
LAND AND MANAGEMENT PLAN-OUACHITA NATIONAL FOREST
ARKANSAS AND OKLAHOMA-FOREST SERVICE SOUTHERN REGION

Please review the above stated document under provisions of Section 404 of the Clean Water Act, Section 102(2) of the National Environmental Policy Act of 1969 and the Arkansas Project Notification and Review System.

March ¹⁵ 2005

Your comments should be returned by _____ to - Mr. Randy Young, Chairman, Technical Review Committee, 101 E. Capitol, Suite 350, Little Rock, AR 72203.

If you have no reply within that time we will assume you have no comments and will proceed with the sign-off.

NOTE: It is Imperative that your response be in to the ASWCC office by the date requested. Should your Agency anticipate having a response which will be delayed beyond the stated deadline for comments, please contact Ms. Debby Davis of the ASWCC at (501) 682-1611 or the State Clearinghouse Office.

_____ Support _____ Do Not Support (Comments Attached)

_____ Comments Attached _____ Support with Following Conditions

☒ No Comments _____ Non-Degradation Certification Issues
(Applies to ADEQ Only)

RECEIVED
05 MAR 21 11 05 AM
SOIL AND WATER CONSERVATION

Name(print) KEVIN DORMAN Agency ADEQ Date 2/28/05

Telephone Number 501-682-0645

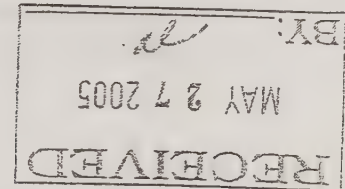


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May 24, 2005



Mr. Alan G. Newman, Forest Supervisor
U.S. Department of Agriculture
Forest Service
Ouachita National Forest
P.O. Box 1270
Hot Springs, AR 71902

RE: Summary Draft Environmental Impact Statement and Proposed Revised Land and
Management Plan - Ouachita National Forest, Arkansas and Oklahoma - Forest
Services Southern Region

Dear Mr. Newman:

The State Clearinghouse has received the above document pursuant to the
Arkansas Project Notification and Review System.

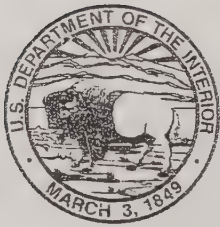
To carry out the review and comment process, this document was forwarded to
members of the Arkansas Technical Review Committee. Resulting comments received
from the Technical Review Committee which represents the position of the State of
Arkansas are attached.

The State Clearinghouse wishes to thank you for your cooperation with the
Arkansas Project Notification and Review System.

Sincerely,

Tracy L. Copeland, Manager
State Clearinghouse

TLC/th
Enclosure
CC: Randy Young, AS&WCC



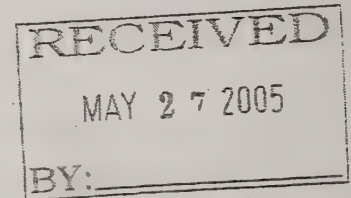
United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
P.O. Box 26567 (MC-9)
Albuquerque, New Mexico 87125-6567



IN REPLY REFER TO:

May 26, 2005



9043.1
ER 05/218

Alett Little
Plan Revision Team
Ouachita National Forest
100 Reserve Street
Hot Springs, Arkansas 71901

Dear Mr. Little:

The U.S. Department of the Interior (DOI) has reviewed the Draft Environmental Impact Statement (DEIS) for the Proposed Revised Land and Resource Management Plan for the Ouachita National Forest (Forest). We offer comments on these documents at two levels, forest-wide management issues, and general and specific items within the draft plan. We appreciate the opportunity to be actively involved in the revision process. Through collaboration with agency partners in Arkansas and Oklahoma, your planning staff has developed revised plans including a diverse land management perspective. Your vision statement speaks directly to ecosystem health and sustainability. This theme is evident throughout the documents.

Forest-Wide Comments

We believe Alternative E provides the best balance of providing for ecosystem health and sustainability while recognizing human influences and incorporating human needs and uses.

Planning Regulations

We recognize that although you are completing the plan revision under the 1982 planning regulations, you are incorporating the spirit of the new planning process. This is evident in the format of the draft revised Plan. We understand you will complete an Ecological Management System (EMS) for the Forest within the next 3 years. As you develop the EMS, we hope you will continue to emphasize ecological health and sustainability of the terrestrial, riparian, and aquatic ecosystems identified for the Forest.

Species Standards

The DOI plans to continue working with you (in developing the species viability evaluation database for the Forest) until the final Plan is completed. This conservation planning tool

will help ensure diversity and sustainability of biological resources. As you finalize the revised land management plan, please include both U. S. Fish and Wildlife Service (FWS) field offices in Conway, Arkansas, and Tulsa, Oklahoma, in review and completion of fine filter strategies for all federally listed, candidate, and species of concern. Doing so will ensure that adequate standards for these species are developed and included in the final revised Plan.

We offer our staff experts for final collaborative development of standards for the following listed species known to occur on or adjacent to the Ouachita National Forest:

Indiana bat
 American burying beetle
 Bald Eagle
 Red-cockaded Woodpecker
 Leopard darter
 Ouachita rock pocketbook
 Scaleshell
 Winged mapleleaf
 Harperella
 Pink mucket
 Arkansas fat mucket

We believe standards will not be needed for the following species, unless new information becomes available on species locations and/or habitat use relative to the forest:

Piping Plover
 Interior Least Tern
 American alligator

Ecosystem Management

Forested ecosystems, such as the Ouachita Highlands and other parts of central North America, have evolved and are adapted to natural and historic anthropogenic disturbances, including frequent burning. Fire and cultural disturbances are essential ecological processes throughout the Ouachitas.

The average annual prescribed burning and the seasonal diversity of burns, dormant and growing season, planned in alternative E should be adequate to accomplish forest-wide fuel reduction, ecological diversity and restoration, and wildlife habitat objectives. Increased monitoring of the expanded burn program should be emphasized to quantify efficacy of treatments against objectives.

Expanded prescribed fire objectives will result in challenges related to increased human-smoke conflicts. Adaptive management mechanisms should be incorporated into the prescribed burning program, with adjustments made based on the results of monitoring. If through monitoring and the best science you learn that planned burn acres need to be

adjusted up or down, you should incorporate into the final Plan the latitude to adjust without having to revise the Plan. We also recommend that you plan for increased public education and information on the role of fire as a management tool for ensuring forest health and sustainability.

We are pleased with the overall direction developed for Management Area 9. It shows that the Forest has placed a high priority on riparian and aquatic health. We recommend that the Forest retain all of the tools necessary to maintain or restore these ecosystems, while not limiting options for invasive species control. The ability to use selective thinning, and in specific instances, conversion of single species plantations to more appropriate riparian forest assemblages should be retained. Application of herbicides approved for aquatic use may be needed to control invasive species now threatening native vegetation adjacent to stream courses. Restoration of stands of native cane on appropriate sites also should be planned and emphasized where ecologically appropriate. We recommend that the Forest place a high priority on identifying unneeded roads within riparian areas. Decommissioning and closure of unneeded roads adjacent to streams will address multiple aquatic and riparian health issues.

A number of introduced species are invasive and threaten the native ecosystems of the Forest. We agree with and support your planning direction for reducing invasive species impacts and avoiding additional introductions of exotics. It will be essential to retain the use of approved herbicides to control effectively unwanted species, such as *Sericea lespedeza* and fescue. We agree with your description of adverse effects caused by the red imported fire ant and encourage the Forest to place high priority on monitoring and treatment to detect further increases in numbers of this insect pest. We also encourage you to develop planning direction for preemptive site-specific fire ant control, although this objective should receive a lower priority than management of invasive plant species.

We support the amount and distribution of shortleaf pine woodland and savanna shown in Management Areas 21 and 22, and 14. We agree with the emphasis and desired condition for Management Area 14 and believe the Forest has designed adequate flexibility into the standards for this management area so that the entire suite of community types can be maintained.

Oak decline is a serious management challenge facing portions of the Forest. Healthy white oaks will live 250-300 years, and healthy red oaks will live 120-150 years. Droughts and native insects like the red oak borer have been part of Ouachita oak ecosystems for several millennia. These forces have historically thinned woodlands in synergy with fire. Some oak forests have become so dense that competition for water, light, and nutrients is intense. Where previously a single tree competed for necessary resources, there may now be a dozen or more trees, each needing as much water, nutrients, and light as the original plant. Because in modern woodlands many more trees are competing for the same amount of nutrients and water, the current dense forest system is under stress and vulnerable to stochastic events at scales outside the historical range of variability.

Recent droughts have been within the historical range of variation. Records indicate that more severe droughts lasting up to 10 years have occurred in recent history without extensive oak mortality. The current overstocked forest may appear healthy during non-drought years, but is stressed, nevertheless. During the slightest dry period, trees become vulnerable to insects and diseases, and as a result, large numbers of trees die. These outbreaks are not a result of drought, but rather the symptoms of a stressed ecosystem incapable of sustaining itself under altered conditions. In addressing oak decline, we believe that the first principle should be recognition that the absence of fire and the resulting excessive density has contributed to the current unhealthy forest condition.

We believe the plans for oak-hickory ecosystem restoration developed and in use on demonstration sites of the South Central Fire Learning Network should be applied on similar sites in the Forest. Participating sites with established plans for addressing oak decline include the Bayou and Pleasant Hill Ranger Districts of the Ozark National Forest. Information and plans for these participating sites can be found at <http://tnc-ecomangement.org/Fire/>.

We encourage the Forest to develop plans to convert any existing fescue and Bermuda pastures to native warm season forage species. Forage improvements by thinning and prescribed burning along with development of small ponds as livestock water sources, and the conversion of off-site loblolly pine plantations, in order to lessen impacts to streams and provide benefits to multiple wildlife species, should be continued.

Recreation

All recreational and access-related uses on the Forest should comply with overall resource protection, health, and public safety with the realization and clear statement within the Forest Plan that there are levels of use the Forest cannot provide. We understand there is new national direction that excludes all-terrain vehicles (ATVs) from the general Forest area. Consideration should be given to establishing all proposed new ATV trails, including designated trails systems, on existing Forest roads to the extent possible. Where new trails are developed, we encourage multi-use trails, as opposed to single-use trails. New trail development should limit the number of stream crossings and access through areas with fragile soils or sensitive resources. The emphasis and development of low impact recreational uses should be restricted to areas where they will not threaten sensitive flora, fauna, or archaeological resources.

Recreational disturbance, potential for soil erosion, and related water quality concerns, combined with insufficient maintenance budgets, all speak to the need to reduce existing open road densities on portions of the Forest. We agree with the Forest road density objective of 1 mile per square-mile of Forest area. We recommend increased use of gates with information signs and reduced use of earthen mounds as road closure devices. Experience has shown that earthen mounds are less effective as closure devices. We also support the increased use of seasonal road closures to balance resource management objectives while providing access during high demand periods.

There seems to be a small difference in acres, approximately 1,180 acres, indicated by Management Area between the Summary in the DEIS and the draft Land and Resource Management Plan. To be accurate and consistent, we suggest you check the calculations of these areas and use the most up to date and accurate figures.

Specific Comments, Summary, DEIS

Page 10, Table S.1. - "Revised" should be defined for this table.

Page 18, Table S.2. - A list of restrictions should be provided to clarify the definition of "Restricted" within Table S.2.

General Comments, DEIS

Chapter 3. Throughout the Chapter. Affected Environment and Environmental Consequences. - The DEIS indicates use of a "Species Viability Evaluation (SVE)" index. The index helps to determine whether specific habitat communities are in "obligate, optimal, suitable, or marginal" condition for indicator species of the Forest's 19 identified ecological systems or subsystems. While bird species can be an indicator of habitat condition, the DEIS cites only two references for endangered birds, each dating from the 1980s (Page 134).

The use of more current data on bird occurrence may aid in determining the ecological status of habitat condition. The U. S. Geological Survey (USGS) has been collecting data on annual bird occurrence since the 1960s. Known as the USGS North American Breeding Bird Survey (BBS) (Sauer, J.R., J.E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966-2003. Version 2004.1. USGS Patuxent Wildlife Research Center, Laurel, MD), trends in bird occurrence can be accessed from the URL <http://www.pwrc.usgs.gov/bbs/>. This website consists of a series of interactive programs and maps that describe population change of North American birds summarized from BBS data.

Specific Comments, Proposed Revised Land and Resource Management Plan

Page 12, Paragraph 1. - Seven to 20 percent is a wide range when talking about the entire Forest. This allows for a determination that the objective has been met for changing this subsystem into the desired condition, even if very little of the subsystem has been restored and maintained. We would like to see the range narrowed to the higher side of the previously stated range, (i.e., from 7-20 percent to 12-20 percent). This will facilitate the recovery of the Red-cockaded Woodpecker through a greater expansion of dependent habitat types, maintenance of this subsystem, and subsequent positive effects on all fauna and flora species associated with this subsystem on the forest. It also will help reduce grazing allotment pressure on existing openings and riparian corridors within this subsystem by expanding the forage base outside of just those areas and providing alternative forage sites. This decrease will also potentially reduce impacts to sensitive aquatic species, such as the leopard darter.

Page 61, OBJ02. - We suggest you increase the minimum annual acres treated for invasive species to 300. Aggressive and proactive preventive and control measures will reduce the

long-term costs associated with preventing and controlling the spread of invasive native and non-native species. This is especially important for control of *Sericea lespedeza* as the canopy is thinned and more prescribed fire is used throughout various management areas on the forest.

Page 62, OBJ09. - The FWS would like to see more than 500 acres per year converted to native habitat types. If this is not possible, we recommend you place emphasis on initial allocation of these acres to Oklahoma portions of the national forest in existing range allotments. This conversion will provide an increased forage base away from sensitive streams and riparian areas and reduce the streamside grazing pressure issues identified on some of the Oklahoma range allotments.

Page 74, Paragraph 1. - Please consider adding the following text to the Threatened, Endangered, and Sensitive Species, and Their Habitats introduction:

“Carry out Forest Service responsibilities for the conservation of endangered and threatened species through interagency consultation with the U. S. Fish and Wildlife Service. Manage federally listed species in accordance with approved recovery plans and under direction from the most recent biological opinion. Issue permits for the collection of federally listed plant and animal species only if collector has a current U. S. Fish and Wildlife Service collecting permit. Threatened and endangered species will be monitored according to terms and conditions listed in the biological opinion for that species. Manage habitat to move species toward recovery and de-listing.

Manage habitats for sensitive species and other species of concern to prevent downward trends in populations or habitat capability, and to prevent federal listing. Sensitive species site records and databases that include the Arkansas Natural Heritage Commission and the Oklahoma Natural Heritage Inventory databases will be maintained and updated periodically. This information along with other information sources will be used to determine future management decisions.”

Page 75, TE002, Page 88, TR007, and Page 92, SU001. - Impacts to federally listed species are not “mitigated.” If road construction may affect or result in the possibility of “take,” endangered species consultation should be initiated.

Page 84, HU003. - Add the following text: “Broadcast application should be used only for noxious weed eradication/control programs, not for general forestry work.”

Page 90, Livestock Grazing, LG002. - Add the following text: “Allotment plans will include forage improvements by way of thinning and prescribed burning along with development of small ponds as livestock water sources, and conversion of off site loblolly pine plantations.” This will divert grazing away from Wild and Scenic River Act corridors and minimize access to all other stream areas.

Page 90, Livestock Grazing. - Add the following standards:

1. Pasture or field systems currently in non-native plant species, such as fescue or Bermuda grass, will be converted to native cool or warm season grasses as opportunities and budgets allow. When seeding to establish or maintain range forage in pastures and openings, use native species compatible with the ecological site.
2. Where grazing is currently allowed, control livestock numbers and mitigate negative effects to restore, enhance, or maintain the integrity of stream channels and banks.
3. Feeding troughs or water troughs will not be placed in riparian zones or defined channels. Salt blocks and mineral blocks will be placed in boxes or containers to control leaching into soils and will be placed in allotment uplands to encourage forage use away from riparian zones.
4. Existing permitted woodland allotments will be phased out as permits are terminated, or if range condition dictates.
5. Provide structural and non-structural improvements that meet overall management goals and objectives to obtain desired livestock distribution and proper forage use throughout grazing allotments.

Page 94, Paragraph 1. - Add the following text: "When catastrophic wildfire events occur on the Ouachita National Forest that threaten known federally listed species or other important forest resources, the local FWS Ecological Services Field Offices would gladly provide support **when** the incident commander deems it necessary for minimizing impacts and emergency consultation."

We agree **that** wildfire and fuels accumulations, invasive species, land conversion in the context of urban interface, and unmanaged recreational use are issues which must be addressed **during** plan revision. Your team has done an excellent job of bringing these threats to the forefront of plan revision and we wish to support you in completing the revision process. As you consider our comments, remember that we look forward to assisting you in completing species viability evaluation fine filter strategy and listed species standards development.

Thank you for the opportunity to review and comment on this DEIS. We hope these comments will be of use as you prepare the final documents.

Sincerely,



Stephen R. Spencer
Regional Environmental Officer

Arkansas Game & Fish Commission
2 Natural Resources Drive Little Rock, Arkansas 72205



David Goad
Deputy Director

Scott Henderson
Director

Scott Henderson
Director

May 26, 2005

Mr. Alan G. Newman, Forest Supervisor
Ouachita National Forest
P.O. Box 1270
Hot Springs, AR 71902

Re: Comments on the Revised Forest Plan

Dear Mr. Newman:

It is indeed a pleasure to have witnessed the cooperative manner that our two agencies employed in developing this revision to the Ouachita National Forest plan. Your agency and more specifically, your planning team is to be commended in their efforts in their collaborations towards the goal we have reached. I personally offer my congratulations to both you and your staff for a job well done in designing an aggressive new approach in this revision towards meeting challenging multiple-use objectives that balance ecological health and sustainability while providing for diverse public uses for our citizens.

I have asked my staff, who have followed this long path with you, to review the proposed plan and submit the attached comments to your team that, in our opinion, will offer some improvements to the document as related to ecosystem health and sustainability, wildlife species viability and recreational use.

The Commission appreciates the opportunity to submit these comments in a spirit of cooperation between our agencies for the betterment of wildlife and the opportunities for generations of Arkansans to enjoy these treasured lands. We look forward to helping see this plan affect positive impacts to the resources in the years to come.

Sincerely,

A handwritten signature in cursive script that reads "Scott Henderson".

Scott Henderson
Director

Phone: 501-681-9000 Fax: 501-681-6444 Website: www.agfc.com

The mission of the Arkansas Game and Fish Commission is to manage wildlife and fish resources for the benefit of the people of Arkansas.

Comments on the Revised Forest Plan, Ouachita National Forest
from the
Arkansas Game and Fish Commission
May 26, 2005

Following are the Arkansas Game and Fish Commission's comments on the final draft of the Ouachita National Forest Land and Resource Management Plan (LRMP) as detailed in the Federal Register. The Commission offers this assistance as a long-standing conservation partner, co-managing the wildlife and aquatic resources of these lands, in order to both provide our support and our recommended improvements to the revised plan.

The Commission staff agrees that Preferred Alternative E best addresses a comprehensive management strategy balancing ecosystem management, wildlife and aquatic species viability and social and economical needs. It is clear that the revised plan is based on the best available science, including a diverse ecosystem management perspective. The vision statement stated within speaks directly to ecosystem health and sustainability while maintaining multiple-use principles.

It is our understanding that the plan incorporates the monitoring, adaptive management, and mandated collaborative guiding principles of the new planning process soon to be enacted. We support these principles embraced in the documents and again thank you for the partnerships forged throughout development of the revised plan. We understand an Ecological Management System (EMS) for the Ouachita National Forest will be prepared within the next three years. This document will further transition the forest into the new planning process. The Commission also is very supportive of the collaborative nature by which the Species Viability Assessment was developed. As the evaluation continues towards the fine filter goals, our agency pledges our assistance in collaboration with other conservation partners.

As mentioned in previous comments, the Commission agrees with Forest Service Chief Bosworth's assessment of the four major threats to National Forests. The Ouachita National Forest has done a great job of assessing and dealing with excessive fuel loads remaining from the recent ice storm, especially within the urban interface. Its' research and work on documenting OHV use and effects on the forest has also aided in moving toward control measures. The Commission agrees that the revised plan addresses all four threats adequately.

The manner by which management is driven at the vegetative community level is very appropriate. The identification of the various ecological communities and their representative seral stages on the landscape is, in our regard, the best method for ensuring that wildlife species are managed for at historic levels. We strongly support species populations to be maintained at the "good" to "very good" levels according to the viability assessment, unless the species is located on the edge of it's range or limited by

the extent of the habitat available. The detailed descriptions of the desired conditions of terrestrial and aquatic ecosystems within the planning document provide our agency with the assurance that this plan is truly taking our native species into consideration while improving the health and sustainability of these forested ecosystems.

Regarding recreation and public access, it is our understanding that implementation of the new national OHV policy will eliminate ATV access to the general forest floor and will define permitted areas where they may be used. We agree with and support this policy change, although we recommend an accelerated analysis to expedite the implementation of this policy. The Commission recommends the use of existing roads and trails for ATV use, avoiding riparian areas and stream crossings, and limiting the amount of any new road or trail construction. When considering new recreational developments, we ask you to place emphasis on low impact uses including hiking, mountain bicycling, rock climbing, wildlife observation, and geo-caching. All recreational activities require monitoring and should be at levels that the Forest can sustain without resource degradation. Additionally, with changes in recreational use policies, the Commission strongly recommends increased enforcement throughout the Forest to help ensure public awareness and compliance.

We strongly support the retention of the road density standard of one mile of open forest road per square mile of general forest area in the revised forest plan. We also support a high priority be placed upon decommissioning un-needed roads and trails, especially within riparian ecosystems. In recent years of limited maintenance budgets for existing roads, the Forest Service has ample justification for closing roads. It is our understanding that the Ouachita Forest averages the decommissioning of approximately 17 miles of roads each year. The manner by which roads are decommissioned is unclear and requires more details as to what methods (rehabilitated, obliterated) will be employed. Riparian health and aquatic viability within drains needs to be balanced with the overall benefits of restoring historic drainages along these selected roads.

When planning road closures, we recommend the increased use of gates with information signs and reduced use of earthen mounds as road closure devices. Experience has shown that gates are more effective than earthen mounds for road closures. We also support the increased use of seasonal road closures to balance resource management objectives while providing access during high demand periods.

The Commission supports the manner by which riparian communities are managed under this plan. Although the plan shows that a high priority has been placed on riparian and aquatic health, the Commission offers the following SMZ recommendations:

<u>SLOPE</u>	<u>0-5%</u>	<u>5-15%</u>	<u>15-35%</u>	<u>35+%</u>
Perennial	100'	100'	125'	150'
Other defined channels	30'	50'	75'	100'

The Ouachita National Forest should also retain all of the tools necessary to maintain or restore these riparian ecosystems and be sure not to limit options for invasive species control.

In regards to vegetative management under the Preferred Alternative, the Commission strongly supports the appropriate use of all silvicultural tools in maintaining the health and sustainability of forest conditions as outlined. Our wildlife species depend upon both a diversity of forest age class and structure at the landscape scale, as well as, a diversity that ecological conditions afford in species compositions. These forested systems are, for the most part, fire-dependent communities and the appropriate use of fire regimes per community is essential in maintaining ecological function and sustainability. The Commission strongly supports the appropriate use of prescribed burning, in keeping with the Smoke Management guidelines developed by the state. This would include those portions of designated wilderness areas that are economically feasible in conjunction with adjacent burns.

The Ouachita National Forest is a national center of excellence in restoring shortleaf pine-bluestem ecosystems. The Commission commends the Ouachita for placing proper emphasis on this initiative and we agree with the distribution of shortleaf pine woodlands shown in Management Areas 21 and 22. As appropriate additional sites are identified we encourage you to further expand restoration of these productive and diverse ecosystems.

Conversely, the oak-dominated communities within the Forest have been neglected from structured management strategies. Natural forces have in the recent past negatively impacted these forest types. New management alternatives and guidelines are required to attain specific objectives for sustainability of these communities. Fire alone will not resolve the years of forest densification and species composition changes within these systems. The Commission strongly recommends more detailed, silvicultural strategies to provide for historic oak woodland conditions throughout the range. The revised plan does not go far enough in detailing plans for oak-dominated forests. Management prescriptions which include commercial and non-commercial thinning of over stocked oak-dominated forest types must be discussed within the framework of the plan in order to ensure sustainability of these ecosystems. The Commission believes the plans for oak-hickory ecosystem restoration developed and in use on demonstration sites of the South Central Fire Learning Network should be applied on similar sites in the Ouachita National Forest.

Where grazing is currently allowed, we ask you to continue to control livestock numbers and mitigate negative effects by restoring, enhancing, or maintaining the integrity of stream channels and banks. We also ask that as interest in the use of existing woodland allotments diminishes, or if declining range conditions indicate, you place a priority on phasing out woodland grazing permits.

The Commission strongly supports the continued emphasis on providing supplemental wildlife plantings for game management throughout the forest. Although the planned vegetative management will result in increases in native herbaceous plants and early

successional habitat, the requirements of late winter foraging resources these wildlife openings provide game species is crucial in maintaining populations levels of several species of wildlife having important social and economical value in local communities. We also recommend additional roadless areas be provided during hunting seasons through the use of seasonal closures of selected roads. These areas will enhance the quality of recreational opportunities while reducing the concentration of hunters.

Under the guidelines of Management Indicator Species (MIS), the revised plan falls short in species indicative of the various aquatic systems within the National Forest boundary. The Commission proposes the following recommendations regarding assessing the health of the aquatic communities. For the Ouachita National Forest, the health of the aquatic community and especially the fish population, would be best monitored by conducting fish samples targeting the entire community, utilizing the Index of Biotic Integrity (IBI or a modification following Karr's work). One of your biologists (Lisa Hlass) has developed a modified IBI for Ouachita streams near Mt. Ida, which should be reviewed for applicability to more Forest streams. In addition, with assistance from Commission personnel, all sport fish should be measured (mm total length) for length frequency analysis. Emphasis should be given to following trends in a five (5) component, feeding guild including Smallmouth Bass (piscivore), Bigeye Shiner (omnivore) and Central Stoneroller (herbivore). We do not feel that this number of species will require intensive monitoring, but too many of some particular species within a stream may indicate a problem in that stream. We support a monitoring system that samples every stream within a three (3) to five (5) year rotation

Additionally, in aquatic management of the National Forest waters, the Commission strongly supports the use of rotenone as a lake sampling tool. This should be considered an allowance at the forest level under a category exclusion and not require an environmental impact statement. In addition, all Rainbow Trout stockings are to continue in the Albert Pike area of the Forest.

Regarding the management of invasive species, the Commission recommends the allowance of both stem and broadcast applications of herbicides for the control of privet, kudzu and fescue. Additionally, we recommend, as a preventive measure of control, pre-treatment of *Sericea lespedeza*, especially along roadsides, in conjunction with prescribed burns. We further agree with your description of adverse effects caused by the imported red fire ant and encourage you to place a high priority on monitoring and treatment to detect further increases in numbers of this insect pest

Aggressive and proactive preventative and control measures will reduce the long-term costs associated with preventing and controlling the spread of invasive native and non-native species. The planned annual treatment is 200 acres forest wide. We believe there is a much greater need for such treatments and would ask that you not consider 200 acres as the maximum annual treatment acres. Rather than suggest a larger acreage, we ask an allowance for flexibility to treat acres identified within budget constraints

If you have improved pasture systems in non-native forage species such as fescue or Bermuda grass we ask that you add language or standards that would plan for conversion to native forage grasses. No new non-native plantings should be allowed.

The Commission thanks you for the opportunity to submit these comments and we commend the Ouachita National Forest Planning Team on a job well done in drafting such a comprehensive forest plan.



Arkansas

THE NATURAL STATE

DEPARTMENT OF PARKS & TOURISM

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AN EQUAL
OPPORTUNITY/
AFFIRMATIVE ACTION/
AMERICANS WITH
DISABILITIES ACT
EMPLOYER

May 27, 2005

Mr. Alan G. Newman, Forest Supervisor
Forest Plan Team
U.S.D.A. Forest Service
P. O. Box 1270
Hot Springs, AR 71902-1270

Re: Draft Environmental Impact Statement
for the Proposed Revised Land and Resource
Management Plan of the Ouachita National Forest
State of Arkansas
ORGP 5-48a

Dear Mr. Newman:

Thank you for this opportunity to review and comment on the proposed land and resource management plan of the Ouachita National Forest. Based on my own and staff review of the plan, I would like to offer the following comments and suggestions:

Pg. 15 Mgt. Bulletin R8-MB 122 B, Alternative E

The Department of Parks and Tourism prefers Alternative E because of its emphasis on managing a healthy and diverse sustainable forest.

Pg. 95 Mgt. Bulletin R8-MB 122 A, Trails

We commend you for your method of resolving user conflict in wilderness areas, along with designing and maintaining trails based on a wilderness experience.

In our meeting with Bill Pell, et. al., we spent considerable time on two specific subjects: OHV use and declining recreational budgets resulting in possible USFS recreation area closures. First, with 1.8 million acres in the Ouachita National Forest, your agency is the largest land managing agency in the state. We all agree that OHV use needs to be managed, but it is a viable outdoor recreation activity. There are few options on other public lands, and USFS strategies and planning should be cognizant of that fact. Secondly, we are concerned about the recreation budget situation and reductions for the Ouachita National Forest. Closing recreation areas will save M&O funds and, depending on "how many" and "where", can have a devastating long-term effect on outdoor recreation in Arkansas. We hope you will continue to pursue partnership opportunities with local governments and organizations for management options.

We appreciate all the work that went into the plan, and your staff's assistance in reviewing the details with us.

Sincerely,

A handwritten signature in cursive script that reads "Greg Butts" followed by a stylized flourish.

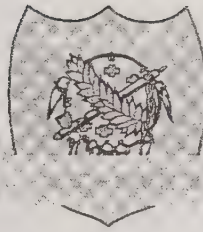
Greg Butts, Director
Arkansas State Parks

cc: Richard W. Davies, Executive Director
Bryan Kellar, Director, Outdoor Recreation Grants Program
Stan Graves, Manager, Planning & Development
Rex Friedman, Chief Planning, Planning & Development
Randy Roberson, Resource Management Specialist
Anita Chouinard, SCORP Planner

WILDLIFE CONSERVATION COMMISSION

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BRAD HENRY, GOVERNOR
GREG D. DUFFY, DIRECTOR



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May 27, 2005

Mr. Alan G. Newman
Forest Supervisor
Ouachita National Forest
P. O. Box 1270
Hot Springs, AR 71902

Subject: Review of the Ouachita National Forest Land and Resource Management Plan and Draft
Environmental Impact Statement

Dear Mr. Newman,

We appreciate the opportunity to review and provide comments on the Proposed Land and Resource Management Plan for the Ouachita National Forest and the accompanying Draft Environmental Impact Statement. Overall, these documents are well written and thoughtfully prepared, and we support most aspects of them.

There are many components of the proposed management plans with which the Oklahoma Department of Wildlife Conservation agrees. Some of these statements, under the Desired Condition of the Ouachita National Forest section, which we particularly support are:

- pg. 8 "Fire, thinning, and other vegetation management practices are used to help sustain the balance of structural and compositional diversity needed to support healthy populations of native plants and animals."
- pg. 9 "Where native species have been displaced by non-native or off-site species, systems will be restored over time to native species composition."
- pg 22 "Desired Condition: Habitat conditions sustain healthy populations of native and desired non-native wildlife and fish species."
- pg 26 "over the planning period, the number of inventoried unclassified roads and trails is reduced, and the development and proliferation of new unclassified roads is minimized."
- Pg 36 "Movement of fish and other aquatic organisms in otherwise free-flowing perennial streams ...will not be obstructed by road crossings, culverts or other human-caused obstructions."

In the Strategy section (pg 50) we strongly support restricting the use of OHVs on the Forest consistent with the proposed national policy: "If the rule is approved in its current form, National Forest Service lands will move to a system of designated routes for motorized vehicles, including OHVs, and toward excluding public use of motorized vehicles from the rest of the forest." We support this policy because it should reduce disturbance to wildlife resources, vegetation and soil. However, we are sensitive to the needs of non-ambulatory sportsmen and would like to see sufficient flexibility in the OHV restrictions to allow their use of OHVs off designated trails during hunting seasons. We believe this could be done with minimal natural resource impact because of the limited number of vehicles that would be involved. Further, non-ambulatory sportsmen use of OHVs would occur during the fall, outside of the typical nesting period for ground-nesting birds and mammals, and relatively level areas could be designated for this purpose to minimize potential erosion concerns.

In the Strategy section, we believe that many of the details specified for MA 21 (pg 42) could and should apply to MA 22 (pg 44) also. The desired condition stated for stands within MA 22 is 60 to 120 square feet of basal area per acre. At the upper end of this range, these stand would be too dense for optimum Red-cockaded Woodpecker habitat and for significant pine reproduction. We feel the range, indicated for MA 21 (30 to 80 square feet basal area per acre) would produce better Red-cockaded Woodpecker habitat and more effectively secure pine regeneration.

A detailed description of the disturbance regime for MA 21 is provided in the Management Plan: "These forests will be maintained by frequent, moderately intense ground fires, some of which will occur in the summer and fall (July- November). Fire return intervals will range from one to more than four years, but will occur on an irregular basis at varying times, seasons, and intensities. Fires will be frequent enough, and hot enough to suppress the woody understory, and to occasionally kill individual overstory trees or small groups of trees." We believe that this description is applicable also to MA 22, for which there are very few details provided regarding how fire will be applied..

The Regeneration section for MA 21 specifies that "The periodic use of prescribed fire under open canopies may promote natural regeneration at irregular intervals, resulting in "banked" advanced reproduction in many core and replacement stands..." At least part of this description should be adapted and applied to the regeneration strategy for MA 22.

The Design Criteria section for MA 21(pg 112) states that livestock grazing will be limited: "Restrict livestock, except where grazing is necessary based on site-specific analysis to mimic the ecological role formerly played by elk and bison. When livestock are in use on surrounding lands, consider their impacts on vegetation on a site-specific basis..." We believe this criterion should apply to MA 22 also.

On page 235 of the Draft Environmental Impact Statement (DEIS), the statement is made that " There are few cumulative effects from the continuation of the grazing program." Later in the same paragraph the author states: "Because grazing levels are below the estimated grazing capacity of the forest, the cumulative effect of the grazing program is considered insignificant."

Over large areas subjected to uniform management practices, these statements may be true. However, on small areas such as stands initially thinned and burned in MA 22, grazing may have a substantial detrimental effect. While the density of cattle on the forest may be light, the animals may be attracted to the newly thinned areas where there is a greater abundance of grasses and forbs and where they selectively graze bluestem and other highly palatable species. The result of such selective, concentrated grazing is that the bluestem and forb component of the understory is severely suppressed and less fuel exists at ground level to carry fires that are required to suppress hardwoods. We have observed the detrimental impact of trespass cattle grazing on the McCurtain County Wilderness Area (MCWA), which is managed to restore Red-cockaded Woodpecker habitat and the pine/bluestem woodland ecosystem. On thinned and burned areas within the MCWA's east side, the combined density of bluestem and native forbs is sparse in late summer compared to similarly treated areas on the area's west side where trespass grazing is not an issue. On the east side clumps of bluestem are scattered several feet apart, one or two feet tall, and virtually every one shows signs of grazing. On the west side, the density of grasses and forbs is much greater, nearly continuous, and often over head high. Given our current experience, we believe that livestock grazing on MA 22 should be eliminated or severely restricted until research has been completed to define the impacts of cattle on pine/bluestem restoration.

Tables 3.82 and 3.83 within the DEIS demonstrate that the public places substantial importance on the maintenance of stream quality, protection of water sources and provision of habitat for fish and wildlife populations. During the public opinion survey, 86 percent of the respondents ranked "maintaining stream quality" as an extremely important management objective. Similarly, 80 percent of the respondents ranked "protecting areas that are sources of water" as a very important management activity. These were the highest ranked items in each aspect of the survey. While the Management Plan adequately addresses most of the fisheries issues within the Ouachita National Forest, it does not appear that the management of aquatic resources and riparian corridors are given consideration in proportion to their ranking by the public. We request that greater consideration be given to the following management points.

- 1) Greater priority should be placed on reducing the impact of road crossings on stream morphology and fish passage. Across the Ouachita Uplift, there are thousands of these stream crossings that are now and have historically affected aquatic resources through the alteration of local hydrology, impairment of sediment transport, reduction in bed and bank stability and impairment of the movement of fish along the stream continuum. The ODWC is working to evaluate these issues in the Glover River watershed and develop a predictive tool to estimate stream impacts by crossing type. Tractable solutions to modifying existing crossings and designing replacements also will be addressed. Our goal is to use the results from this study to prioritize and restore the crossings in most need of enhancement and to design crossings that are more compatible with the maintenance of proper stream function.

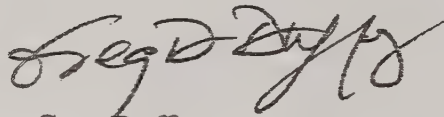
- 2) The ODWC has collected a substantial amount of data regarding the status of stream-dwelling sport fish in the Ouachita uplift. These data include logistically demanding collections of the smallmouth bass which is designated as a management indicator species in the Plan. We would like to improve the sharing of data between our agencies and develop communication

protocols that will assist the ONF in incorporate these data into the Forest Plan and reduce potential duplication of sampling efforts.

3) The plan states that streamside management areas are, depending on their location, between 100 and 30-feet in width. Limited cutting will be allowed in these areas, however the concept of limited cutting is vague and should be defined more explicitly such that conservative land management practices in these sensitive areas are maintained.

In closing, we would like to again commend you and your staff on a well written Management Plan. If you have any questions or need additional clarification on the points raised in this letter, please contact Ron Suttles, Natural Resources Coordinator, at 405/521-4602.

Sincerely,

A handwritten signature in black ink, appearing to read "Greg Duffy", with a stylized flourish at the end.

Greg Duffy
Director

Appendix B – The Analysis Process

Land management planning is the mechanism for comparing strategic options of differing programmatic mixes of activities and land allocations. It also requires that mathematical modeling techniques be used to identify the most economically efficient solution to meet the goals and objectives of any alternative. Appendix B presents a technical discussion of the analysis process and computer models used in the Revision planning effort. The Appendix focuses on the quantitative methods used to perform the analysis and documents how the analysis was done. The results from the modeling processes are estimates of what can be expected if alternatives are implemented. These estimates facilitate comparison of alternatives.

The Forest's major analysis goal is to provide enough information to help decision-makers and the public determine which combination of goods, services, and land allocations will maximize Net Public Benefits (NPB). The regulations (36 CFR 219) developed under the National Forest Management Act (NFMA) provide the analytical framework within which these decisions are made.

The NFMA and its regulations also state that the requirements of the National Environmental Policy Act (NEPA) and its regulations (40 CFR 1500-1508) must be applied in this analytic process. The NEPA regulations in place when this Forest Plan revision was initiated and completed require that the environmental effects of a proposed action and alternatives to that proposed action be disclosed in an Environmental Impact Statement (EIS).

Information presented in this appendix supplements the broader and less technical descriptions included in the body of the EIS. This discussion includes basic assumptions, modeling components and inputs, rules, methods, and constraints. Additional information and documents used in the analysis process are contained in the planning process records. The planning record in its entirety is incorporated here by reference.

Framework of the Planning Process

The general planning process described in 36 CFR 219.12 was used to guide the revision of the Ouachita National Forest Land and Resource Management Plan. This 10-Step process is described briefly below, followed by a more detailed discussion of the analytical processes used in Steps 3, 4, and 6.

STEP 1 - Identification of purpose and need: Issues, Concerns, and Opportunities. The Forest's Planning Team assessed changes in public issues, management concerns, and resource use and development opportunities since the Amended 1990 Plan was initially developed and subsequently amended.

STEP 2 - Planning Criteria: Criteria are designed to guide the collection and use of inventory data and information; the analysis of the management situation; and the design, formulation, and evaluation of alternatives. This step establishes guidelines for accomplishing the next five steps. Planning criteria are based on:

- ▶ Laws, executive orders, regulations and agency policy as set forth in the Forest Service Manual.
- ▶ Goals and objectives in the USDA Forest Service's Strategic Plan.

- ▶ Recommendations and assumptions developed from public issues, management concerns, and resource use and development opportunities.
- ▶ The plans and programs of other federal agencies, state and local governments, and Indian tribes.
- ▶ Ecological, technical, and other factors.
- ▶ The resource integration and management requirements in 36 CFR 219.13 through 219.27.
- ▶ Alternatives that are technically possible to implement.
- ▶ Alternatives that meet management requirements or standards.
- ▶ Various levels of multiple-use objectives and outputs achieved.

STEP 3 - Inventory Data and Information Collection: The kinds of data and information needed are determined in Step 2 based on the issues, concerns, and opportunities identified and the resulting assessment of the management situation and determination of what needs to change. Data collection is part of normal forest operations. Existing data are used whenever possible and are supplemented with new data, when practicable. Data accuracy is continually evaluated. Much of the data and background documentation is on file in the planning records in the Supervisor's Office.

STEP 4 - Analysis of the Management Situation: This step describes the existing situation on the Forest and determines if there is a need to change current management direction. It examines supply potentials and market assessments for goods and services, assesses demand for goods and services from National Forest System lands, and determines suitability and feasibility for meeting needs. This information provides the basis for formulating an appropriate range of reasonable alternatives.

STEP 5 - Formulation of Alternatives: A reasonable range of alternatives is formulated according to NEPA procedures. Alternatives are formulated to assist in identifying one that comes nearest to maximizing net public benefits (NPB). They provide for the resolution of significant issues and concerns identified in Step 1. Chapter 2 of the EIS describes the formulation of alternatives for the Ouachita National Forest in more detail.

The alternatives reflect a range of resource management. Each identified major public issue and management concern is addressed in different ways in the alternatives. The programs and land allocations in each alternative represent the most cost-efficient way of attaining the goals and objectives for that alternative. Both priced and non-priced goods and services (outputs) are considered in formulating each alternative.

STEP 6 - Estimated Effects of Alternatives: The physical, biological, economic, and social effects of implementing each alternative are described in Chapter 3 of the EIS in an effort to evaluate how well each alternative responds to issues, concerns, and opportunities and what the potential impacts to resources might be.

STEP 7 - Evaluation of Alternatives: Physical, biological, economic, and social effects of implementing alternatives are used to evaluate each alternative and compare them with one another. Typically, each alternative can be judged on the basis of how it addresses the significant issues, concerns, and opportunities (ICOs) identified in Chapter 1 of the EIS.

Appendix B of the EIS presents the possible outputs and activities associated with each alternative.

STEP 8 - Preferred Alternative: The Forest Supervisor reviews the Planning Team's evaluation of each alternative and the public issues and concerns. The Forest Supervisor then recommends a preferred alternative to the Regional Forester. The Regional Forester either selects the Forest Supervisor's recommendation, another alternative, or modifies the alternative recommended by the Forest Supervisor. This alternative is described as the Preferred Alternative in the DEIS and is displayed separately as the Proposed Revised Forest Plan. Public comments are solicited and are considered as the draft Revised Forest Plan and DEIS are finalized.

STEP 9- Plan Approval and Implementation: After the Planning Team has reviewed public comments and incorporated any necessary changes into the Final EIS and the Revised Forest Plan, the Regional Forester reviews and approves the Revised Forest Plan and Final Environmental Impact Statement. A Record of Decision documents this step.

STEP 10 - Monitoring and Evaluation: The Revised Forest Plan establishes a system of measuring, on a sample basis, actual activities and their effects, and compares these results with projections contained in the Revised Forest Plan. Monitoring and evaluation comprises an essential feedback mechanism to ensure the Revised Forest Plan is dynamic and responsive to change.

Inventory Data and Information Collection (Step 3)

Several Interdisciplinary Team meetings were held to evaluate what data were needed to address the significant issues, concerns, and opportunities identified in Chapter 1 of the EIS. Existing inventories were reviewed and updated, and new information needs were identified and collected, if available. Most of the information was stored in databases, spreadsheets, and a geographic information system (GIS).

GIS Data Layers

A geographic information system (GIS) was used to develop the primary Forest Plan revision database. GIS links natural resource tabular information with spatial (map) information. This linkage enables complex spatial analyses and rapid display for many different physical, biological, or administrative resources. The resulting database was used to preliminarily map the allocation of the management prescriptions, analyze suitable timber lands, build the forest planning model Spectrum analysis areas, and perform other analyses for the revision. GIS data used in this analysis were those available as of October 2003. To develop the database, the following layers were overlaid in GIS:

- ▶ The Continuous Inventory of Stand Condition (CISC) – until recently, the Southern Region's primary forest vegetation and stand inventory information that relates to forest cover type, age, site index, and land classification. The mapping of the management prescriptions for each alternative used recent CISC data. The Continuous Inventory of Stand Conditions, CISC, 1993, is the database component of the Silvicultural Examination and Prescription Process as documented in the Silvicultural Examination and Prescription Handbook, FSH 2409.26d, R8 Amendment 2409.26d-93-1. US Department of Agriculture, Forest Service.

- ▶ **Land Status** – This layer contains information on Forest surface ownership. The lands layer was updated several times throughout the process to incorporate new acquisitions.
- ▶ **Digital Elevation Models (DEMs)** – The DEMs were used for creation of slope maps, shaded relief maps, and contour maps; for determination of what part of the landscape is visible from various locations; and for analysis of difficulty of traversing the terrain.
- ▶ **Watersheds** – This layer included Hydrologic Unit Code (HUC) mapping at both the fifth and sixth levels.
- ▶ **Riparian** – This layer is an approximation of the riparian habitat on the forest. It is impracticable to map the true riparian corridors in detail due to the complexity of slope, vegetation, and other factors that help define the corridor. This coverage was generated by buffering perennial streams and lakes by 100 feet and by buffering a representation of intermittent stream channels by 30 feet.
- ▶ **Inventoried Roadless Areas** – Discussion of the data used in the roadless area evaluations is covered in Appendix G.
- ▶ **Developed Recreation Sites** – Includes established recreation areas, trailheads, and shooting ranges.
- ▶ **Scenery Management System (SMS)** – This layer addressed the visual resources and included attributes related to scenic integrity, distance zone, scenic attractiveness, and concern level.
- ▶ **Recreation Opportunity Spectrum (ROS)** – This layer represented the recreation experience expected in a particular area and included attributes such as rural, roaded natural, semi-primitive motorized and semi-primitive non-motorized.
- ▶ **Transportation (Travel Routes)** – This layer included the public and Forest Service roads and trails within the Forest boundary.
- ▶ **Special Areas** – This layer includes Special Interest Areas (SIAs), Wilderness Areas, Research Natural Areas (RNAs), Wild and Scenic River Corridors, and Scenic Byways.
- ▶ **Management Areas**– This layer included Wilderness and special management areas based upon the 1990 Plan, as amended.
- ▶ **Streams and Watercourses** – This layer included intermittent and perennial streams, lakes, rivers, and ponds.
- ▶ **Terrestrial Ecological Communities** – A derived layer based upon stand level (CISC) forest types for most communities combined with additional inventory and mapping for other communities.

- **Ecological Classification System (Land Type Associations and Land Types)** - At the landscape scale, ecological units are defined by general topography, geomorphic process, surficial geology, associations of soil families, and potential natural communities, patterns, and local climates. Landtype association ecological units represent this scale in the hierarchy. These are groupings of landtypes or subdivisions of subsections based on similarities in geomorphic process, geologic rock types, soil complexes, stream types, lakes, wetlands, subseries, or plant association vegetation communities.

Analysis of the Management Situation (Step 4)

In addition to the emerging issues, the need for change was identified through the Analysis of the Management Situation for the Ouachita National Forest (AMS). This analysis considered the results of monitoring and evaluation, other policy and direction since the previous Plan, the 5-Year Review, the current condition of the resources, ecoregional and regional assessments, and supply and demand factors to determine the need for change in management direction, as well as the ability of the planning area covered by the Forest Plan to supply goods and services. It provided a basis for formulating a broad range of reasonable alternatives. The processes and results for the supply and demand analyses are briefly discussed below. The process records contain the full supply and demand analyses.

Many decisions to conduct management actions were made before the effective date of the Revised Forest Plan but will not be fully implemented before the Revised Forest Plan goes into effect. These "pre-existing actions" (made under the 1990 Amended Forest Plan) were treated as part of the baseline for the Environmental Impact Statement and the Revised Forest Plan. The projected effects of these pre-existing actions are part of the cumulative effects analyses documented in the FEIS and Biological Assessment for the Revised Plan. Those analyses indicate that the continued implementation of these previously decided actions will not foreclose the ability to meet the desired conditions and objectives of this Revised Forest Plan. Table B.46, B.47, and B.48 (at the end of this appendix) provide lists of major project decisions containing timber harvest and other management activities that may not be completed until after the 2005 Revised Forest Plan goes into effect.

Determination of Demand Estimates

Recreation

This section provides additional details related to recreation supply and demand that were not covered in Chapter 3 of the FEIS. Recreation demands were based on several sources: 1) the findings of the Ozark-Ouachita Highlands Assessment; 2) Regional Demand and Supply Projections for Outdoor Recreation (1993 update to the 1989 RPA Assessment) by English et al.; 3) Ouachita and Ozark National Forests Recreation Realignment Report, August 2001; 4) Arkansas SCORP 1995; and 5) Outdoor Recreation in American Life, A National Assessment of Demand and Supply Trends (Cordell 1999).

National Forest recreation visits were estimated based upon data collected through the National Visitor Use Monitoring (NVUM) project. This project was implemented throughout the National Forest System in response to the need to better understand use of and satisfaction with recreation settings and to provide a standard means of quantifying recreation use across the system within a reasonable confidence level. National Forest plans, Executive Order 12862 (Setting Customer Service Standards), and implementation of

the National Recreation Agenda require this level of understanding. The agency's Strategic and Annual Performance Plans require measuring trends in user satisfaction and use levels to be able to improve public service, which will assist Congress, Forest Service leaders, and program managers in making sound decisions that best serve the public and protect valuable natural resources. The information collected is also important to external customers such as state agencies and private industry. NVUM methodology and analysis is explained in detail in the research paper entitled: Forest Service NVUM Process: Research Method Documentation; English, Kocis, Zarnoch, and Arnold; SE Experiment Station; May 2001 (<http://www.fs.fed.us/recreation/recuse/recuse.shtml>).

The first round of data collection was completed for the Ouachita National Forest in 2001, and the report was completed in 2002. The project utilized randomly selected stratified sites across the forest in four categories: Day Use Developed (DUD), Overnight Use Developed (OUD), General Forest Area (GFA), and Wilderness (Wild). Both proxy and non-proxy site data were collected. Factors based upon national data were used as multipliers to estimate total visits by category. The spreadsheets used to calculate visits are available in the process records for this plan. Following is a brief description of the NVUM process.

In conjunction with guidelines and recommendations from the Outdoor Recreation Review Commission, the USDA-Forest Service has estimated recreation use and maintained records since the 1950s. Many publications on preferred techniques for estimating recreation use at developed and dispersed recreation sites were sponsored by Forest Service Research Stations and Universities. Implementation of these recommended methodologies takes specific skills, a dedicated work force, and strict adherence to an appropriate sampling plan. The earliest estimates were designed to estimate use at developed fee recreation facilities such as campgrounds. These estimates have always been fairly reliable because they are based upon readily observable, objective counts of items such as a fee envelope.

Prior to the mid-1990s, the Forest Service used its Recreation Information Management (RIM) system to store and analyze recreation use information. Forest managers often found they lacked the resources to both manage the recreation facilities and simultaneously monitor visitor use following the established protocols. In 1996, the RIM monitoring protocols were no longer required to be used.

In 1998, a group of research and forest staff was appointed to investigate and pilot a recreation sampling system that would be cost effective and provide statistical recreation use information at the forest, national, and regional level. Since that time, a permanent sampling system (NVUM) has been developed. Several Forest Service staff areas including Recreation, Wilderness, Ecosystem Management, Research and Strategic Planning, and Resource Assessment are involved in implementing the program. A four-year cycle of data collection was established. In any given year, 25 percent of the national forests conduct on-site interviews and sampling of recreation visitors. The first 25 percent of the forests included in the first four-year cycle completed sampling in December of 2000. The last 25 percent of the first, four-year cycle forests will complete their sampling in September 2003. The cycle begins again in October 2004. This ongoing cycle will provide quality recreation information needed for improving citizen centered recreation services.

Definition of Terms

NVUM has standardized definitions of visitor use measurement to ensure that all national forest visitor measurements are comparable. These definitions are the same as established by the Forest Service since the 1970s; however, the application of the definition is stricter.

Visitors must pursue a recreation activity physically located “on” Forest Service managed land in order to be counted. They cannot be passing through; viewing from non-Forest Service managed roads, or just using restroom facilities. The NVUM basic use measurements are national forest visits and site visits. In addition, information about the visitor’s trip is also collected. Along with these use measurements, basic statistics, which indicate the precision of the estimate, are given. These statistics include the confidence level and error rate. The definitions of these terms follow.

National forest visit – the entry of one person upon a national forest to participate in recreation activities for an unspecified period of time. A national forest visit can be composed of multiple site visits.

Site visit – the entry of one person onto a national forest site or area to participate in recreation activities for an unspecified period of time.

Recreation trip – the duration of time beginning when the visitor left their home and ending when they got back to their home.

Confidence level and error rate – used together these two terms define the reliability of the estimated visits. The confidence interval defines the range of values around the estimated visits with a specified level of certainty. The error rate (which is not a negative thing like making an error on a test) is the upper and lower bounds of the confidence interval. The lower the error rate and the higher the confidence level, the better the estimate. An 80 percent confidence interval is very acceptable at a broad national or forest scale. The two terms are used to statistically describe the estimate. For example: at the 80 percent confidence level, there are 209 million national forest visits plus or minus 17 percent. In other words, we are 80 percent confident that the true number of national forest visits lies between 173.5 million and 244.5 million.

The NVUM Process and Definition of Terms

To participate in the NVUM process, forests first categorize all recreation sites and areas into six basic categories called “site types:” Day Use Developed Sites (DUDS), Overnight Use Developed Sites (OUDS), Wilderness (WILD), General Forest Areas (GFA), On-Forest Viewing Corridors (OFVC), and Off-Forest Recreation Activities. Only the first four categories are considered “true” national forest visits and were included in the estimate provided. Within these broad categories every open day of the year for each site/area was rated as high, medium, or low exiting recreation use. Sites and areas that were closed or had “0” use were also identified. Each day on which a site or area is open is called a site day and is the basic sampling unit for the survey. Results of this forest categorization are shown in Table B.1.

Table B.1 RPA Activity Group Summary from NVUM Data for Alternative A (Current)

RPA Category	DUD		OUD		GFA		WILD		TOTAL
	%	M Visits	%	M Visits	%	M Visits	%	M Visits	M Visits
Camping, Picnicking, Swimming	22	34	100	52	3	21	0	0	107
Mechanical Travel & Viewing Scenery	0	0	0	0	40	256	0	0	256
Hiking, Horseback Riding, Water Travel	0	0	0	0	25	156	0	0	156
Fish & Wildlife	47	71	0	0	25	156	0	0	227
Wilderness	0	0	0	0	0	0	100	18	18
Other	31	47	0	0	7	48	0	0	95
Total	100	152	100	52	100	637	100	18	859

A map showing all General Forest Exit locations and On-Forest Viewing Corridors was prepared. Both the categorization and the map are archived with the NVUM data for use in future sample years. NVUM also provided training materials, equipment, survey forms, funding, and the protocol necessary for the forest to gather visitor use information.

NVUM terms used in the site categorization framework are defined below:

Site day – a day that a recreation site or area is open to the public for recreation purposes.

Site types – stratification of a forest recreation site or area into one of six broad categories as defined in the paper: Forest Service National Visitor Use Monitoring Process: Research Method Documentation, May 2001, English and others. The six categories are Day Use Developed sites (DUDS), Overnight Use Developed Sites (OUDS), General Forest Areas (GFA), Wilderness (WILD), On-Forest View Corridors (OFVC), and Off-Forest Recreation Activities (Off Forest).

Proxy – information collected at a recreation site or area that is related to the amount of recreation visitation received. The proxy information must pertain to all users of the site, it must be an exact tally of use, and it must be one of the proxy types allowed in the NVUM pre-work directions (fee receipts, fee envelopes, mandatory permits, permanent traffic counters, ticket sales, and daily use records).

Nonproxy – a recreation site or area that does not have proxy information. At these sites, a 24-hour traffic count is taken to measure total use for one day at the sample site.

Use level strata – for either proxy or nonproxy sites, each day that a recreation site or area was open for recreation, the site day was categorized as either high, medium or low exiting recreation traffic, or closed. Closed was defined as either administratively closed or “0” use. For example, Smokey Bear Picnic Area (a DUDS nonproxy site) is closed for 120 days, has high exiting use on open weekends (70 days) and medium exiting recreation use on open midweek days (175 days). This accounts for all 365 days of the

year at Smokey Bear Picnic area. This process was repeated for every developed site and area on the forest.

Assumptions by alternative about recreation programs use were based on the overall theme and emphasis of each alternative as stated in its description. These assumptions related to the quality and location of recreation activities and, as such, cannot be reflected in the estimates of supply and capacity for developed recreation, dispersed recreation, general forest/trails, and wilderness.

The Ouachita National Forest NVUM data were further refined to RPA activity groups for use in the Present Net Value (PNV) and Jobs/Income calculations for the FEIS. The percent breakdown by RPA activity group was done using NVUM survey results from the Ouachita National Forest NVUM data and local experience. Table B.1 shows a summary of the conversion of visits by the NVUM categories to the RPA activity groups for the Forest under Alternative A (No Action Alternative, 1990 Amended Forest Plan). Visits were converted to trips and shown by Use Category (a combination of RPA activities) for each alternative in Table B.2 (See Table 3.101 in the FEIS for 50 year projections) in order to understand the economic impacts of recreation and wildlife visitor experiences. No differences among alternatives were indicated

Table B.2 Recreation Trips by Use Categories by Alternative

Resource	Alternatives				
	A	B	C	D	E
Recreation					
Local Residents Day Use	514,800	514,800	514,800	514,800	514,800
Non-Local Residents Day Use	188,400	188,400	188,400	188,400	188,400
Local Residents Overnight off the NF	100,500	100,500	100,500	100,500	100,500
Non-Local Residents Overnight off the NF	238,600	238,600	238,600	238,600	238,600
Local Residents Overnight on the NF	62,800	62,800	62,800	62,800	62,800
Non-Local Residents Overnight on NF	150,700	150,700	150,700	150,700	150,700
Wildlife & Fish					
Local Residents Day Use	115,100	115,100	115,100	115,100	115,100
Non-Local Residents Day Use	42,100	42,100	42,100	42,100	42,100
Local Residents Overnight off the NF	22,400	22,400	22,400	22,400	22,400
Non-Local Residents Overnight off the NF	53,300	53,300	53,300	53,300	53,300
Local Residents Overnight on the NF	14,000	14,000	14,000	14,000	14,000
Non-Local Residents Overnight on NF	33,700	33,700	33,700	33,700	33,700

Wildlife and Fisheries

The Recreation demand projections addressed hunting, fishing and wildlife viewing. Chapter 3 of the EIS discusses trends in certain wildlife “demand species” selected as management Indicator Species (MIS): Northern Bobwhite, White-Tailed Deer, and Eastern Wild Turkey.

Range

Projections for range were derived from the past history of the range program on the Forest, the 1989 Recommended RPA Program (USDA 1990) and the Forest Service Program for Forest and Rangeland Resources (USDA 1995). Since demand for the program is in decline, no differences were analyzed by alternative. Capacity was calculated to be more than adequate to meet existing demand.

Timber

Ouachita NF Timber Supply-Demand Analysis

The Ouachita NF timber market area, in which the Forest supplies mills in its area, resides within a “competitive zone” where Forest supplied mills compete for timber from other outlying areas. The “competitive zone” is considered to include the following counties (in AR unless otherwise noted); Choctaw (OK), Clark, Conway, Dallas, Garland, Grant, Hempstead, Hot Spring, Howard, Johnson, Latimer (OK), LeFlore (OK), Little River, Logan, McCurtain (OK), Miller, Montgomery, Nevada, Perry, Pike, Polk, Pope, Pulaski, Pushmataha (OK), Saline, Scott, Sebastian, Sevier, and Yell. Within these counties, other land ownerships compete to supply timber to the mills in this area. The Ouachita NF meets only a fraction of the total demand.

Data to perform a supply-demand analysis comes from the USDA-FS Forest Inventory Analysis system at the North Central Research Station. Unfortunately, the Ouachita NF data are somewhat dated—1995 for Arkansas and 1993 for the Oklahoma portion. More recent 2002 Arkansas data are matched by recent data for the Oklahoma counties of the Ouachita. Therefore, this analysis used the “old” complete data. Although using the 1990’s data still results in mixing of two different survey years of data, a general idea of characteristics is still valid. Table B.3 includes relevant statistics for each of the counties within the competitive zone for the Ouachita National Forest.

Table B.3 (Part 1) Ouachita National Forest Timber Competitive Zone Characteristics

Competitive Zone Counties	Vol. Growing Stock (mcf)	Mortality of Growing Stock (mcf)	Percent of Growing Stock with Mortality	Removals of Growing Stock (mcf)	Percent of Growing Stock from Removals	Net Growth of Growing Stock (mcf)
Clark	562,481	2,585	0.46	19,942	3.55	26,605
Conway	152,813	689	0.45	2,643	1.73	6,504
Dallas	520,484	2,618	0.50	25,264	4.85	27,467
Garland	412,221	1,603	0.39	4,807	1.17	18,595
Grant	526,115	2,575	0.49	24,430	4.64	26,660
Hempstead	385,596	1,836	0.48	29,863	7.74	26,974
Hot Spring	314,190	2,455	0.78	12,371	3.94	23,519
Howard	258,325	2,161	0.84	16,900	6.54	22,453
Johnson	422,336	1,438	0.34	6,982	1.65	15,121
Little River	275,094	1,129	0.41	9,443	3.43	13,434
Logan	280,032	1,221	0.44	4,162	1.49	11,148
Miller	198,123	697	0.35	10,382	5.24	10,407
Montgomery	664,701	2,999	0.45	11,070	1.67	11,055
Nevada	425,743	3,114	0.73	27,664	6.50	22,674
Perry	359,530	1,113	0.31	4,561	1.27	15,487
Pike	351,661	4,534	1.29	16,852	4.79	23,302
Polk	449,301	2,177	0.48	11,621	2.59	17,734
Pope	486,751	2,425	0.50	5,378	1.10	15,840
Pulaski	219,396	747	0.34	7,867	3.59	9,606
Saline	413,393	1,085	0.26	14,436	3.49	19,991
Scott	665,608	1,548	0.23	15,944	2.40	20,609
Sebastian	89,606	409	0.46	1,016	1.13	3,363
Sevier	245,851	2,261	0.92	15,539	6.32	11,481
Yell	589,961	2,689	0.46	5,282	0.90	20,415
AR Total	8,782,561	43,902	0.50	299,038	3.40	404,603
Choctaw	97,816	647	0.66	1,884	1.93	4,343
Latimer	157,019	343	0.22	3,346	2.13	7,499
Leflore	509,618	1,121	0.22	9,485	1.86	32,984
McCurtain	662,876	2,945	0.44	31,361	4.73	56,009
Pushmataha	513,910	1,517	0.30	19,817	3.86	36,566
OKTotal	1,941,238	6,573	0.34	65,893	3.39	137,401
Grand Total	10,723,799	50,475	0.47	364,931	3.40	542,004

Table B.3 (continued - Part 2) Ouachita National Forest Timber Competitive Zone Characteristics

Timber Competitive Zone Counties:	Ratio of Removals to Net Growth	Cut & Sold Reports Ouachita NF Removals (MCF)	Ouachita NF % of Competitive Zone Total	FIA Data Ouachita NF Removals (MCF)	FIA Data Ouachita NF % of Market Area Total
Clark	1.33				
Conway	2.46				
Dallas	1.09				
Garland	3.87			476	9.9
Grant	1.09				
Hempstead	0.90				
Hot Spring	1.90				
Howard	1.33				
Johnson	2.17				
Little River	1.42				
Logan	2.68				
Miller	1.00				
Montgomery	1.00			6,357	57.4
Nevada	0.82				
Perry	3.40			927	20.3
Pike	1.38				
Polk	1.53			3,092	26.6
Pope	2.95				
Pulaski	1.22				
Saline	1.38				
Scott	1.29			9,055	56.8
Sebastian	3.31				
Sevier	0.74				
Yell	3.87			2,701	51.1
AR Total	1.35	23,095	7.7	22,608	7.6
Choctaw	2.31				
Latimer	2.24				
Leflore	3.48			6,384	
McCurtain	1.79			912	
Pushmataha	1.85				
OK Total	2.09	4,296	6.5	7,296	11.1
Grand Total	1.49	27,391	7.5	29,904	8.2

Significant findings within this area where the National Forest competes with other land ownerships are as follows. Total growing stock volume for this forest (all ownerships) is 11.2 million mcf. Of this total, only 0.5 percent represents growing stock with mortality.

Removals from growing stock in each county's respective survey year amounted to about 3.3 percent of the growing stock available. Removal was especially high in Dallas, Hempstead, Nevada, and McCurtain (OK) counties. The ratio of removals to growing stock was particularly high in Dallas, Hempstead, Miller, Nevada, and McCurtain (OK) where removals were between about 5-7 percent of growing stock for a given year of harvest. Of these counties, only McCurtain County includes lands within the National Forest proclamation boundary.

The growth-drain ratio for the Ouachita NF's competitive zone is about 1.5, indicating that growth is 50 percent more than harvesting during the year of survey.

Harvest data for the Ouachita NF were taken from Forest Service Cut-and-Sold reports for 1995 and 1993 for Arkansas and Oklahoma counties, respectively. Of the total harvests in the competitive zone, the Ouachita's share was about 7.5 percent, indicating that federal land ownership was a relatively small source of all timber harvested in this competitive area. Within the competitive zone, the Ouachita NF has a relatively small share of all timber activity. This timber area has a healthy margin of removals to growth and a small mortality share of total growing stock.

The same four variables from FIA data were used to assess the timber condition on the Ouachita NF as were used to characterize the Ouachita's role in its overall competitive area. Growing stock contrasted with mortality proved to be very small. By county, the percentage of mortality to growing stock ranged from 0 to 0.39 percent, with an overall forest percentage of 0.30 percent (see Table B.4).

Table B.4 Ouachita National Forest Timber Characteristics

Counties	Vol. Growing Stock mcf	Mortality of Growing Stock mcf	% of Growing Stock with Mortality	Removals of Growing Stock mcf	Percent of Growing Stock from Removals	Net Growth of Growing Stock mcf	Ratio of Removals to Net Growth	Cut & Sold Reports Removals (MCF)	FIA Data Removals (MCF)
Ashley	0	0	0	0	0	0	0		
Garland	172,959	794	0.46	476	0.28	4,571	9.60		476
Hot Spring	430	0	0.00	0	0.00	0	0.00		
Howard	3,665	0	0.00	0	0.00	0	0.00		
Logan	24,359	0	0.00	0	0.00	884	0.00		
Montgomery	560,144	2,184	0.39	6,357	1.13	7,157	1.13		6,357
Perry	158,683	590	0.37	927	0.58	5,834	6.29		927
Pike	4,503	0	0.00	0	0.00	0	0.00		
Polk	243,930	1,341	0.55	3,092	1.27	5,262	1.70		3,092
Saline	90,120	0	0.00	0	0.00	2,470	0.00		
Scott	560,864	1,342	0.24	9,055	1.61	15,158	1.67		9,055
Sebastian	13,734	0	0.00	0	0.00	0	0.00		
Yell	310,414	785	0.25	2,701	0.87	8,843	3.27		2,701
AR Total	2,143,805	7,036	0.33	22,608	1.05	50,179	2.22	23,095	22,608
LeFlore	194,928	145	0.07	6,384	3.28	9,965	1.56		6,384
McCurtain	99,267	241	0.24	912	0.92	4,870	5.34		912
OK Total	294,195	386		7,296		14,835		4,296	7,296
Grand Total	2,438,000	7,422	0.30	29,904	1.23	65,014	2.17	27,391	29,904

Growing stock on the Ouachita NF was estimated to be 2,438,000 MCF in the mid-1990s. Removals were estimated to be 29,904 MCF for a drain ratio of 1.23 percent. During this same time, net growth was estimated to be 65,014 MCF per year. Contrasted with removals of 29,904 MCF yields a removal to growth ratio of one to 2.17 for the entire forest—a very healthy condition in terms of sustainable timber supply.

Based on mid-1990's FIA data, growth, mortality, and removals of timber are in a favorable position on the Ouachita NF. Growth is healthy, mortality is very small, and removals are a very small part of the growing stock. Since the mid-1990's data were collected, an ice storm in December 2000 downed or damaged a large number of trees in several parts of the forest.

Minerals

Congress passed a law in 1987 that updated and enlarged the Forest Service role in administering surface operations for oil and gas development on National Forest System lands (Federal Onshore Oil and Gas Leasing Reform Act of 1987). The reasonably foreseeable development projected for the Selected Alternative, 2005 Revised Forest Plan (see Appendix F) was developed based on the law and the implementing regulations, including the 36 CFR 228E regulations for Forest Service review and approval of surface use plans of operations and is discussed in detail in Chapter 3 of the EIS and in Appendix F. The reasonably foreseeable development included an estimate of the number of wells, miles of access road and pipeline construction, and acres of clearing for well pads, access roads, and pipelines. The development of new gas wells, access roads and associated facilities would occur over 15 years, which is the expected time span for the Revised Forest Plan.

Timber Analysis

Benchmark Analysis

Benchmark analysis is specified in the NFMA regulation in 36 CFR 219.12(e) as part of the Analysis of the Management Situation. Benchmarks approximate maximum economic and biological resource production opportunities and are useful in evaluating the compatibilities and conflicts between individual resource objectives and in defining the range within integrated alternatives can be developed. Selection of benchmarks to develop is dependent upon the revision topics. Benchmarks are primarily modeled in SPECTRUM by changing the objective function and by adjusting constraints. Because the SPECTRUM model was developed primarily to model communities and vegetation structure (with structural changes resulting from prescribed fire and timber harvesting), only one timber related benchmark was developed in addition to one that reflected the current level of management.

The NFMA regulations in 36 CFR 219.27 list management requirements that must be considered in benchmark analysis. The following basic management requirements were included in all of the benchmark SPECTRUM models:

- Non-declining flow and long-term sustained yield
- All suitable timberlands are included in the analysis
- Early seral minimum acreages and mature hardwood and mast requirements

CUR – Current Level Benchmark

This benchmark was the same as Alternative A.

TIM – Maximum Timber Benchmark

This benchmark was used to identify the timber production potential of the Forest, subject to these specifications:

The objective function maximizes timber volume, with a rollover to maximize present new value. The rollover locks in the timber volumes from the timber maximization and then optimizes on costs and revenues.

PNV – Maximum Present Net Value Benchmark

During analysis for the 1990 Amended Forest Plan, this benchmark was needed to help define the range of prescriptive possibilities to be modeled. This helped establish the scope of what might be considered when defining alternatives. During the current Forest Plan Revision, the scope was defined as what needed to change from current management. With this more narrowly refined scope, the Maximum Present Net Value Benchmark did not need to be updated from the original analysis.

MIN – Minimal Level of Management Benchmark

During analysis for the 1990 Amended Forest Plan, this benchmark was needed to help define the range of prescriptive possibilities to be modeled. This helped establish the scope of what might be considered when defining alternatives. During the current Forest Plan Revision, the scope was defined as what needed to change from current management. With this more narrowly refined scope, the Minimum Level of Management Benchmark did not need to be updated from the original analysis.

Timber Suitability

The National Forest management Act (NFMA) of 1976 identifies 'suitability' as "the appropriateness of applying certain resource management practices to a particular area of land, as determined by an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices." During Forest Planning, the Forest Service is required to identify lands unsuited for timber production (16 USC 1604(k); 36 CFR 219.14). This identification process involves three stages of analysis. Stage I analysis identifies lands tentatively suitable for timber production. Stage II analysis is designed to explore the financial aspect of varying intensities of timber management on lands identified as tentatively suitable for timber production from Stage I. Stage III analysis identifies lands as unsuited for timber production under the alternatives selected in the revised Forest Land and Resource Management Plan.

The Ouachita National Forest Interdisciplinary Team (ID Team) determined that, based upon analysis for the 1990 Forest Plan and subsequent Plan Amendments, Timber Suitability had already been well defined. Thus, the only variation in timber suitability among the alternatives relates to the differing amounts of recommended wilderness. This would change the amount of acres available for consideration as suitable for Timber. Otherwise, the initial Stage I through Stage III suitability analysis is that analysis done for the 1990 Forest Plan and subsequent Amendments. The ID Team then balanced the acreage against land ownership totals as of October 1, 2003 (as reflected in the Table B.5).

Table B.5 Timber Suitability Classification

Classification	Acres	Source (Land Class data taken from CISC forest stand database)
Nonforest - Water	4,916	NHD
Nonforest – Roads	15,001	All_arcs.shp – clipped by surfown multiplied by average road width of 22 feet
Nonforest – Admin	780	Land Class 860, 870, 871
Nonforest – Developed Recreation	2,139	Land Class 850
Nonforest from CISC	8,447	All Land Class 100 & 200
Total Nonforest	31,283	See Above
Total Forested	1,748,818	Total NF Acres minus Total Nonforest
Withdrawn - Wilderness	64,469	2002 Lands book pgs. 102, 103, 133
Withdrawn – Scenic Areas	4,195	1990 Plan
Withdrawn – Research Natural Areas	2,035	1990 Plan
Withdrawn – Poteau Mountain Management Area	3,958	1990 Plan
Withdrawn – Botanical Areas	11,456	1990 Plan (Beech Creek – 380; Kerr – 7,876; Rich Mountain – 3,200)
Withdrawn – Wild / Scenic Rivers	14,639	Land Records (Little MO – 4,272 ac & Cossatot – 3,654 ac) + Amendment 34 (Glover and Mountain Fork – 6,713 ac)
Total Withdrawn	100,752	See Above
Not Capable	5,479	Land Class 900
Tentatively Suitable	1,642,587	Total Forest minus Total Withdrawn minus Not Capable
Land not Appropriate for timber production	622,893	278,284 acres riparian plus 344,609 acres of other Land Class 800 lands (excluding those above)
Unsuitable Forest Land	729,124	Total Withdrawn plus Not Capable plus Land not Appropriate for timber production
Total Suitable Forest Land	1,019,694	Total NF Forest Acres minus Unsuitable Forest Land
Total NF Acres	1,780,101	as of 10/1/03

Stage I: Physical Suitability

The first stage of the timber suitability analysis addressed the administrative and physical suitability of the land administered by the Ouachita National Forest. The primary outcome of the Stage I analysis are the acres remaining after analysis is complete. These acres are considered “tentatively suitable.” Stage I lands unsuitable for timber production include:

- ▶ Non-Forest lands
- ▶ Lands that have been administratively or congressionally withdrawn from timber production by an act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service
- ▶ Forest lands incapable of producing industrial wood

Total tentatively suitable acres equals 1,642,587 acres.

Stage II: Financial Analysis

The Stage II analysis is designed to explore the financial efficiency of different timber intensities on the lands identified as tentatively suitable for timber production in Stage I. It does not identify any lands as unsuitable for timber production. Stage III analysis considers the results of these financial efficiencies in making the final determination of lands suited for timber production.

Stage II analysis was conducted for the 1990 Amended Forest Plan and set the scope for that and subsequent determinations of Timber suitability. According to Appendix B of the 1990 Final Supplement to the Final Environmental Impact Statement, Land and Resource Management Plan, Page B-33:

"STAGE 2

The second stage in the process was to test the tentatively suitable lands against the management prescriptions to determine their economic feasibility and efficiency. All Analysis Areas in the FORPLAN V_II model showed positive Present Net Value (PNV) with the highest PNV typically obtained with a Timber emphasis using clearcutting (97.5 percent). Some of the stands (age 90+) show the highest PNV with a Timber & Wildlife emphasis using clearcutting to create a mixed management type (2.5 percent).

. . . None of the prescriptions had a PNV less than zero. Since all prescriptions generated a positive PNV, no further analysis of economic suitability was required at this point."

Since none of the factors initially considered have changed in a way that would have any impact upon financial efficiency considerations, this stage of the analysis was not repeated. Since that initial determination, the highest PNV (with both the highest costs and revenues) prescription of clearcutting with artificial regeneration has been relegated from widespread application to very limited application where specific conditions warrant. The other prescriptions of seedtree, shelterwood and selection harvesting rely principally upon natural regeneration which has a lower attendant cost and lower harvest revenues due to the retention of a portion of the stand.

Stage III: Identification of Suitable Acres

Lands for which planned periodic timber harvest would preclude the achievement of other non-timber management objectives are subtracted from the tentatively suited acres (Stage I). Since the scope of this Forest Plan Revision analysis examines reasonable changes from current management (Alternative A), the only changes in Timber Suitability acres are related to the amount of lands recommended for wilderness designation. During alternative formulation, the acres shown in Table B.6 were determined to be "not appropriate for timber production." Due to land allocation varying among alternatives, Stage III suitable acres will also vary.

Table B.6 Suitable and Unsuitable Acres Comparison

Alternative	Unsuitable Acres	Suitable Acres
A	729,124	1,019,694
B	729,124	1,019,694
C	730,917	1,017,901
D	759,251	989,567
E	732,590	1,016,228

Analytical Tools Used

IMPLAN

The economic effects to local counties, primarily in terms of employment and income, were estimated using an economic input-output model with Impact Analysis for Planning (IMPLAN). IMPLAN is a commercial software package for personal computers that uses the latest national input-output tables from the Bureau of Economic Analysis. The data consist of national-level technology matrices and estimates of industrial sector activity for final demands, final payments, industry outputs and employment for each county in the U.S. along with state and national trends. The software was originally developed by the Forest Service and is now maintained by the Minnesota IMPLAN Group, Inc (MIG). Data used for the impact analysis were from secondary data for those counties considered to be in the Forest's impact area. The assumption used in this modeling process was that the impact area comprised the counties within the designated county boundaries. The data source used in developing the Ouachita National Forest model for impact purposes was the most recent data available from MIG (2002).

Input-output analysis gives estimates of employment and income for an increase in final demand on certain sectors of the economy. For Forest Service timber, we have looked at the sawmill and roundwood industries where our timber goes as the first processing step in manufacturing. Impacts include all those industries initially impacted as well as those industries linked with supplying inputs to production and workers in those industries who then spend wages in their households (known as direct, indirect, and induced effects, respectively). A Forest Service developed spreadsheet, known as "FEAST" (Forest Economic Analysis Spreadsheet Tool), was used to apply the IMPLAN results to each alternative, which was expressed in units of output. FEAST transformed the dollar impact for a given industry from IMPLAN to the various resource outputs by alternative into a specific employment and dollar output.

Pre-Suppose

Pre-Suppose is a program used to query and sort Forest Inventory and Analysis (FIA) data for use in the growth and yield model. It was developed to assist forest analysts in producing strata for management planning. The program allows the user to evaluate, select or discard plots that fit desired criteria and create support files that directly link to the Suppose interface for the Forest Vegetation Simulator.

Suppose

Suppose is a computer program that was used to simulate the changes in forest vegetation over a long time span at the 'landscape' level spatial scope. Suppose accomplished the simulation by creating an input file used by the Forest Vegetation Simulator (FVS) and starting the FVS program that reads and processes the input file. The program contains the desired geographic variant and extensions to the base FVS system. FVS, not Suppose, actually accomplishes the desired simulation.

Forest Vegetation Simulation Model (FVS)

The primary tool for estimating growth and yield used in the SPECTRUM model is the Forest Vegetation Simulator (FVS) model. FVS is an individual-tree, distance-independent, growth and yield model. It has its structural roots in the Stand Prognosis Model developed by Albert Stage from the Intermountain Research Station. Staffs at the USFS Forest Management Service Center in Fort Collins, Colorado, have calibrated numerous variants of the model to specific geographic regions throughout the United States. Each variant uses different species-specific growth and yield equations and assumptions. The southern variant was used for developing yield tables for the Ouachita National Forest SPECTRUM model.

FVS allows the user to calculate estimates of forest stand structure and species composition over time and quantify this information to: 1) describe current and future forest stand conditions; 2) simplify complex concepts of forest vegetation into user defined indices, attributes, etc.; and 3) allow the manager to ask better questions about growth and yield of forested stands and complete analyses to answer those questions. For the purposes of the Ouachita National Forest plan revision, Forest Inventory and Analysis (FIA) data for the Southern Region was in a format that FVS could use. These data are collected by the Forest Inventory and Analysis Unit of the Southern Research Station for each State on a continuous cycle in order to provide unbiased, accurate, current, and relevant forest resource information that meets the diverse needs of land stewardship.

The FVS model structure contains modules for growing trees, predicting mortality, simulating growth reductions due to stocking, calculating tree volumes, and producing reports. The volumes generated from the FVS simulations were subsequently harmonized with the yields generated for the 1990 significant Forest Plan Amendment. This allowed them to better reflect programmatic harvest choices rather than the stand level choices from the FVS simulations.

Development of the SPECTRUM Model

Land management planning is the mechanism for comparing strategic options of differing programmatic mixes of activities and land allocations. Over time these choices will create different conditions across the forest. A forest model allows simultaneous consideration of a mixture of different options spread across the forest. It can evaluate whether desired conditions are feasible when taking all resource management goals and objectives into consideration. This allows managers to evaluate and make decisions about land allocations and future activities. The SPECTRUM model is an evolved version of FORPLAN, a linear programming model that solves for an overall objective, such as maximizing present net worth of benefits and costs. It is an excellent tool for determining the most cost-efficient way to reach objectives and for analyzing the impacts to vegetative conditions over time from various mixes of management activities.

In the past, this model has been used to support land allocation decisions; however, for this Revised Forest Plan, those land allocations were essentially determined through the mapping of Management Areas (with the exception of Alternative A which retained Management Areas from the 1990 Amended Forest Plan). The only differences in Management Areas were those due to differences in recommended wilderness by alternative. Within SPECTRUM, only Management Areas with forest conditions were modeled. Vegetation was classified based upon forest community and structure. For those areas with no substantial change in the way the community was to be managed, SPECTRUM was used to track changes over time. Where management changes were considered, there were two options: one was to treat the land with the Current emphasis; and the other was to treat the land with a more intensive Health emphasis. Those lands currently being treated with a Health emphasis were not given a Current emphasis to consider since that commitment had already been made. The best example of this situation is Management Area 22, the Shortleaf Pine / Bluestem Grass Ecosystem and Red Cockaded Woodpecker Habitat. While the Ouachita National Forest model considered timber harvest and applied the required timber harvest policy constraints, the allocative choices in the model were based upon the stated objectives of the Alternative. The timber factors were used to help schedule levels of harvest activity considered to be reasonable based upon expected budgets and other operational factors.

SPECTRUM Model Overview

The model was designed and solved in the following steps:

- ▶ Model creation – Designing the SPECTRUM model was the most extensive of the four steps. In this setup the modeler input resource data, specified resource interactions, set goals and objectives, outlined management actions, defined activities and outputs, set the planning horizon, stratified the landscape into similar response areas, and input economic data.
- ▶ Matrix Generation – Generating the matrix was the process of converting the input from step one to a matrix of rows and columns that the optimization software can solve.
- ▶ Optimization of the Solution – The commercial software C-Whiz was used to solve the matrix. The linear programming solver found the best mix of management actions to meet the management objectives.
- ▶ Interpretation of the Solution – The final step in the modeling process was to use the reports and outputs created in SPECTRUM to interpret the results of the optimization and perform sensitivity analysis.

The six basic components of the SPECTRUM model include the following and are discussed individually in this section:

- ▶ The planning horizon
- ▶ Land stratification
- ▶ Management prescriptions
- ▶ Activities and outputs and their associated costs and benefits
- ▶ Constraints
- ▶ Objectives Functions

Planning Horizon

Each SPECTRUM model has a specific time frame known as a 'planning horizon' that may be as short or long as desired and is broken into time periods of 10 years each. The Ouachita National Forest model used a planning horizon of 200 years, with 20 time periods, or decades. Activities and outputs are primarily represented/reported in SPECTRUM on a decadal basis, occurring at the mid-point of the decade.

Land Stratification

Analysis areas are defined as units of land, not necessarily contiguous, which can be considered to be homogeneous with respect to responses to treatments in term of yields, costs, and values received for resource outputs. Since the forest's inherent suitability and accessibility for timber harvesting was analyzed and determined previously, measures such as slope and distance from roads were not considered in this analysis. Management objectives or constraints are also expected to be relatively uniform throughout an analysis area. In SPECTRUM, each analysis area is allowed up to six stratification categories to identify its unique responses to treatments, yields, costs, values, and constraints. The Ouachita National Forest used five 'layers' to stratify the land. They are as follows:

- ▶ Layer 1 = Community plus Structure
- ▶ Layer 2 = Recreation Zones plus Special recreation areas (roadless, semi-primitive motorized, wilderness, wild & scenic rivers, and scenic areas)
- ▶ Layer 3 = Wildlife Areas (MA 21 – designated old growth, Management Area 22 – RCW/SLP Bluestem, walk-in turkey areas, and co-op wildlife management areas)
- ▶ Layer 4 = Initially Vulnerable Watersheds, but then used as a second community identifier
- ▶ Layer 5 = Scenic class 1, 2, or 3

The unique combinations of these five layers are known as "analysis units." The Ouachita National Forest used a combination of Geographic Information system (GIS) data layers to construct its analysis units. A detailed description of the GIS layer development process can be found in the process record.

Layer 1 – Community plus Structure

Layer one is a combination of fourteen NatureServe Communities (a fifteenth community comprising the Red Slough WMA was not included in SPECTRUM) with four structural conditions (grass/forb, shrub, immature [or mid-seral], and mature [or late-seral]). The Ouachita Shortleaf Pine-Oak Forest and Woodland was further subdivided into: Ouachita Shortleaf Pine-Oak Forest; Ouachita Pine-Oak Woodland; and Ouachita Shortleaf Pine-Bluestem and stratified into high and low productivity classes. These terrestrial vegetation communities or "system" types provide species composition as listed in CISC for the broad community/system types from NatureServe for the Ouachita National Forest, as follows:

- 1.) Ouachita Shortleaf Pine-Oak Forest and Woodland CES202.313
 - 31: Loblolly Pine
 - 32: Shortleaf Pine
 - 22: Slash Pine
 - 12: Shortleaf Pine-Oak
 - 13: Loblolly Pine-Hardwoods
 - 44: Southern Red Oak-Yellow Pine
 - 45: Chestnut Oak-Scarlet Oak-Yellow pine
 - 47: White Oak-Black Oak- Yellow Pine

- 2.) Ouachita Dry-Mesic Hardwood Forest CES202.708
48: Northern Red Oak-Hickory-Yellow Pine
53: White Oak-Northern Red Oak-Hickory
- 3.) Ouachita Mesic Hardwood Forest CES202.043
54: White Oak
55: Northern Red Oak
56: Yellow Poplar-White-Northern Red Oaks
- 4.) Central Interior Highlands Dry Acidic Glade and Barrens CES202.692
11: Eastern Red Cedar-Hardwood
35: Eastern Red Cedar
43: Oak-Eastern Red Cedar
- 5.) Ouachita Montane Oak Forest CES202.306
49: Bear-Scrub Oaks-Yellow Pine
52: Chestnut Oak (chinquapin)
57: Scrub Oak
- 6.) Ouachita Dry Oak Woodlands CES202707
60: Chestnut Oak-Scarlet Oak
51: Post Oak-Black Oak
- 7.) South-Central Interior Large Floodplain CES202.705
40: Hardwood-Pond Pine
82: Black Walnut
95: Chestnut
98: Undrained Flatwoods
- 8.) Ouachita Riparian CES202.703
46: Bottomland Hardwoods-Yellow Pine
50: Yellow Poplar
58: Sweet Gum-Yellow Poplar
61: Swamp Chestnut Oak-Cherrybark Oak
62: Sweet Gum-Nuttall Oak-Willow
63: Sugarberry-American Elm-Green Ash
64: Laurel Oak-Willow Oak
69: Beech-Magnolia
72: River Birch-Sycamore
75: Sycamore-Pecan-American Elm
- 9.) West Gulf Coastal Plain Pine-Hardwood Flatwoods CES203.378
(Tiak & Crossett)
31: Loblolly Pine
13: Loblolly Pine-Hardwoods

Data for the community types below were extracted from site records, not CISC data.

- 10.) Ouachita Novaculite Glade and Woodland CES202.314
- 11.) Ouachita Mountain Forested Seeps CES202.321
- 12.) Central Interior Acidic Cliff and Talus CES202.689
- 13.) West Gulf Coastal Plain Small Stream and River Forest CES203.487
- 14.) Southern Arkansas Calcareous Prairie CES203.377

Structure is defined by seven categories that are listed below:

NAME	POSITION
Early Seral	grass and forb layer
Seedling/Sapling/Shrub	shrub layer
Immature Forest	subordinate canopy layer
Immature Woodlands	subordinate canopy layer
Mature Forest	dominant canopy layer
Mature Woodlands	dominant canopy layer
Shortleaf Pine/Bluestem	dominant canopy/herbaceous layer

Process criteria for defining structure using CISC variables were as follows:

1. Early seral → stand_cond = 1, 15 and age_year Greater than or Equal to 1998
2. Seedling/Sapling/Shrub → Stand_cond = 1, 13, 14, 15 and age_year Less than 1998
3. Mature Woodland → Condition = [sawtimber (Stand_cond = 3, 6, 8, 10, 12); type = pine and Total_ba Less than or Equal to 70] **OR** [sawtimber (Stand_cond = 3, 6, 8, 10, 12); type = hdwd and Total_ba Less than or Equal to 60]
4. Mature Forest → Condition = [sawtimber (Stand_cond = 3, 6, 8, 10, 12); type = pine and Total_ba Greater than 70] **OR** [sawtimber (Stand_cond = 3, 6, 8, 10, 12); type = hdwd and Total_ba Greater than 60]
5. Immature Woodland → Condition = [pole (Stand_cond = 2, 5, 7, 9, 11); type = pine and Total_ba Less than or Equal to 70] **OR** [pole (Stand_cond = 2, 5, 7, 9, 11); type = hdwd and Total_ba Less than or Equal to 60]
6. Immature Forest → Condition = [pole (Stand_cond = 2, 5, 7, 9, 11); type = pine and Total_ba Greater than 70] **OR** [pole (Stand_cond = 2, 5, 7, 9, 11); type = hdwd and Total_ba Greater than 60]
7. Assumption #1 → Riparian structure = Mature Forest
8. Assumption #2 → Most other polygons with unknown structure = Immature Forest
9. Assumption #3 → If the unknown appeared to be recently acquired, then DOQQs were checked and if stand had appearance of recent regeneration, structure = Seedling/Sapling/Shrub.

High productivity class was then defined as Site Index 60 and above, with Low productivity class defined as Site Index less than 60. Existing range allotments were also identified as part of layer 1, but since no allocative or activity based issues were identified for these allotments, the data was not used in subsequent analysis.

Layer 2 - Recreation Regions plus Special recreation areas (roadless, semi-primitive motorized, wilderness, wild & scenic rivers, and scenic areas)

This layer was derived using Geographic Information Systems (GIS) data. Data representing all Recreation Regions and Special Recreation areas were used to clip those portions of Layer 1 within each of the defined Layer 2 areas. Table B.7 shows the combinations that were used to define Layer 2.

Table B.7 Layer 2 Names and Descriptions

Name	Description
north	north region ordinary
nspm	north region semi-primitive
n_wnss	north region wilderness
nrlls	north region roadless
south	south region ordinary
s_wnss	south region wilderness
s_scen	south region scenic area
nowest	northwest region ordinary
nw_spm	northwest region semi-primitive
east	eastern region - ordinary
ewnss	east region wilderness
espm	east region semi-primitive
sowest	southwest region ordinary
swrlls	southwest region roadless
nrdspm	north region roadless & semi-primitive
nwwnss	northwest region wilderness
srlls	south region roadless
s_wsr	south region wild & scenic river
s_spm	south region semi-primitive
nwrlls	northwest region roadless
erlls	east region roadless

Layer 3 - Wildlife Areas (Management Area 21 – designated old growth, Management Area 22 – RCW/SLP Bluestem, walk-in turkey areas, and wildlife management areas.

This layer was derived using Geographic Information Systems (GIS) data. Data representing the designated wildlife emphasis areas were used to clip those portions of combined Layers 1 and 2 within each of the defined Layer 3 areas. Combinations shown in Table B.8 were used.

Table B.8 Layer 3 Names and Descriptions

Name	Description
22tky	MA 22 walk in turkey areas
MA22	MA 22 slp bluestem rcw hma
21wma	MA 21 wildlife management areas
MA21	MA 21old growth
turkey	walk in turkey areas
WMA	wildlife management areas
nowlf	no special wildlife
WMATky	wildlife management areas & walk in turkey areas
21tky	MA 21 walk in turkey areas

Layer 4 - Initially Vulnerable Watersheds, but then used as a second community identifier

This layer was derived using Geographic Information Systems (GIS) data. Data representing the designated vulnerable watersheds were used to clip those portions of combined Layers 1, 2 and 3 within each of the defined Layer 4 areas. The combinations shown below were used:

nvHUC: HUC
VUHUC

Subsequent information from the Forest hydrologist indicated that vulnerable watersheds would not be needed as a basis for selecting allocations or activities, so Layer 4 was converted to a redundant but simplified way to identify vegetation communities. The following combinations were used:

L4slp: slp bluestem
L4pwdl: pine oak woodland
L4CaIP: calcareous prairie community
L4ClfT: cliff & talus community
L4DryO: dry oak community
L4Glad: glade community
L4Mhdw: mesic hardwood community
L4MonO: montane oak community
L4Novc: novaculite community
L4RdSl: red slough community
L4Ripr: riparian community
L4POfr: pine oak forest community
L4Seps: seeps community
L4WGll: west gulf loblolly community
L4DMhd: dry Mesic hardwood community

Layer 5 - Scenic class 1, 2, or 3

This layer was derived using Geographic Information Systems (GIS) data. Data representing Scenic classes 1, 2, and 3 was used to clip those portions of combined Layers 1, 2, 3, and 4 within each of the defined Layer 5 areas. Due to the increase in visual sensitivity from Scenic Class 3 to Scenic Class 1, logging costs were increased to account for the additional coordination and mitigation required. Combinations as shown below were used:

- 1scene: scenic class 1 (logging cost 20% higher)
- 2scene: scenic class 2 (logging cost 10 % higher)
- 3scene: scenic class 3

Vegetation Management Prescriptions

The array of potential vegetation treatments applied to an analysis unit is represented in the SPECTRUM model by sets of actions known as management actions. Generally, a management action in SPECTRUM refers to a set of treatments or practices designed to develop or protect some combination of resources on a particular land type. Eighteen Silviculture treatments were simulated in FVS in order to meet various vegetation manipulations and land management objectives. These prescriptions and their associated treatments are displayed in Table B.9.

Table B.9 Vegetation Management Prescriptions

Vegetation Management Rx	Forest Health Prescribed Fire	Thinnings	Regeneration Harvest
selection (current - selection)	n/a	ten year periodic entry	n/a
current pine-oak	n/a	once every 20 years	At 60-200 yrs
health shortleaf pine / bluestem	burn 3 times per 10 year period	once every 10 years	At 160-220 yrs
health pine-oak forest	burn 2 times per 10 year period	once every 10 years	At 80-130 yrs
health dry-mesic hdwd	burn 2 times per 10 year period	once every 20 years	At 110-190 yrs
health west gulf loblolly	burn 3 times per 10 year period	n/a	At 70-90 yrs
health pine-oak woodland	burn 3 times per 10 year period	once every 10 years	At 70-220 yrs
current West Gulf Loblolly	n/a	once every 10 years	At 50-100 yrs
Current - regeneration only	n/a	n/a	At 60-200 yrs
Health embeds	burn frequency varies by specific community	n/a	n/a

Activities, Outputs and Conditions

Vegetation Management Prescriptions applied to Analysis Areas impose a selected set of activities to create a flow of outputs and a set of conditions over time. This information is aggregated into forest-wide totals to provide measures by alternative. Table B.10 lists all Activities, Outputs, and Conditions considered in the SPECTRUM model.

Table B.10 Activities, Outputs, and Conditions Considered in the SPECTRUM Model.

Name	Description	Units
LTSY	PREDEFINED: Long Term Sustained Yield	mcf
SAV	PREDEFINED: Stand Average Volume	mcf
INV	Inventory volume	mcf
ASQ	PREDEFINED: Allowable Sale Quantity	mcf
canopy	canopy closure score (1 to 4)	score
earlys	acres of early seral condition	acres
mids	acres of mid seral condition	acres
lates	acres of late seral condition	acres
ppole	pine pole harvest	mcf
psaw	pine sawtimber harvest	mcf
hpole	hardwood pole harvest	mcf
hsaw	hardwood sawtimber harvest	mcf
spbhaz	acre of pine BA GTEQ 100 = high hazard	acre
oakdec	acre of oak decline hazard SI EQLT 60 & BA EQGT 75	acre
seltbr	sell timber - used to accumulate cost of timber operations	dollars
whlst	whole stand volume	mcf
deer	deer habcap	deer
turkey	turkey habcap	turkey
quail	quail habcap	quail
pwdpkr	pileated woodpecker habcap	wdpkrs
prwrbh	prairie warbler habcap	wrbhrs
sctang	scarlet tanager habcap	tngrs
frcc1	acres in Fire Regime Condition Class 1	acres
frcc2	Acres in Fire Regime Condition Class 2	acres
frcc3	Acres in Fire Regime Condition Class 3	Acres
RXburn	Total acres of prescribed burning	acres
MastHD	Acres of Mast producing Hardwood (age GTEQ 5)	acres
hlthac	acres in ecosystem health prescription	acres
sobudget	place to enter periodic program budget	m_dollars
hdwtot	total hardwood cubic volume	mcf
pintot	pine total cubic volume	mcf
harvac	acres harvested	acres
achlth	acres of health RX	acres
burncost	links costs to acres of output RXburn	dollars
okdcal	acres allocated for oak decline calc	acres
spbalc	acres allocated for spb haz calc	acres
alloc	acres allocated for ycmp	acre
CReac	current even aged acres	acre
age1	acres of age class 1	acres
matpin	pine age 8+	acres

Costs and revenues associated with these activities and flows were based upon programmatic budgets and timber appraisal values. Outputs representing wildlife species were based upon yield coefficients used for project level analysis. Conditions expressed as acres represent the acres that are in that specific condition either due to vegetation management or natural changes over time. For details, see the planning process records on file in the Ouachita NF Supervisor's Office.

Constraints

The SPECTRUM model constructed for each alternative was basically identical in terms of the Analysis Areas; Vegetation Management Prescriptions available; and the Activities, Outputs, and Conditions that could occur. What made each Alternative different was the amount of Activities, Outputs, and Conditions specified and the locations where Vegetation Management Prescriptions might be applied. These differences were specified by model behavior rules called Constraints. Several constraints were developed for the SPECTRUM model in response to standards and objectives and the management requirements in the NFMA regulations. These constraints either had to do with timber flow characteristics or species diversity requirements.

The Following SPECTRUM constraints were applied to all alternatives.

- ▶ Long Term Sustained Yield (LTSY) constraint was used to ensure that the harvest of timber in the last decade is not greater than the long-term timber production capacity of the Forests. Long-term sustained yield capacity was computed using the acreage scheduled to each regeneration prescription applied in the model.
- ▶ The Perpetual Timber Harvest constraint was used to ensure that the remaining timber inventory would allow achievement of non-declining harvest levels beyond the modeling horizon. To achieve this condition the constraint required that the Forest contain as much timber inventory volume at the end of the last decade as the Forest would have, on average, under the management intensities selected in the analysis. Without this constraint the SPECTRUM model would have no reason to leave any inventory at the end of the planning period to sustain timber harvest levels into perpetuity.
- ▶ The Non-Declining Yield constraint was used to ensure that the harvest of timber in a decade was greater than or equal to the harvest of timber in the previous decade. This constraint indirectly limited the model to a lower present net value and reduced flow of timber in the early decades but also provided community economic and social stability through the controlled flow of timber.
- ▶ Each alternative was modeled with the same objective function: to solve for the maximization of present net value.
- ▶ Constraints were also established to set a minimum and maximum for Early Seral condition from forest regeneration; to set minimum acreages for mature hardwoods and pines and for hard mast; and to set the amount of acres suitable for timber harvest.
- ▶ Each alternative then had constraints to establish the initial Allowable Sale Quantity; specify the acres allocated to uneven-aged harvest and to allow specific Vegetation Management Prescriptions on specific communities or geographic areas.

Objective Function

The objective function allows specification of an overall objective to be met in a given run of the model while all constraints otherwise specified are met. The SPECTRUM models for all of the Ouachita NF alternatives were designed to solve for the most economical manner in which to accomplish those inherent objective. Therefore, all of the alternatives had an objective function to solve for maximum present net value for all activities and outputs.

Social and Economic Analysis

The purpose of this portion of Appendix B is to provide interested readers with additional details regarding the social and economic analyses. This section does not provide sufficient information to replicate the analysis. For that level of detail, the companion specialist reports contained in the administrative record should be consulted.

The Models

Economic effects to local counties were estimated using Impact Analysis for Planning (IMPLAN) Professional 2.0, an economic input/output model. IMPLAN is a software and database system that uses the latest economic data, such as national input/output tables from the Bureau of Economic Analysis. The software and data were originally developed by the Forest Service and are now maintained by the Minnesota IMPLAN Group, Inc (MIG). Data used for the impact analysis were from secondary data for the eighteen counties considered to be in the forests impact areas. The assumption used in this modeling process was that the impact area comprised the counties within the forest's designated county boundaries and represents a functional economic area. The data source used in developing the Ouachita National Forest models for impact purposes was the 2002 IMPLAN data set available from MIG. Model construction within IMPLAN aggregates all the counties selected for inclusion within the impact area.

Input/output analysis gives estimates of employment and income for an increase in final demand on certain sectors of the economy. For National Forest timber, for example, we looked at the sawmill and pulpwood industries where the timber goes as the first processing step in manufacturing. Impacts include all those industries initially impacted as well as those industries linked with supplying inputs to production, as well as workers in those industries who spend wages in their households (known as direct, indirect and induced effects). Thus, the impact assumes a new demand is made on the economy and estimates what the new increase in final demand will mean in employment and income to the economy. Input/output modeling (an equity analysis which tells how income and jobs are distributed throughout and economy for a given economic impact) has nothing to do with benefit cost (an efficiency analysis which estimates how efficient monies are spent on investment activities).

Dependency Analysis

The IMPLAN model was used to assess the economic dependencies of the Ouachita National Forest planning area. Economic dependency is a way of assessing the strength (what drives the economy) of regional or local economies. Regional economies generally depend on their exports to grow most local income and employment. Based on these data, it is reasonable to estimate economic dependency by examining an area's export base. The export base analysis done for this EIS measured the total contribution of one sector, or industry, to the economy. Industries can import and export similar commodities. Those industries having more exports than imports are considered "basic", and thereby allow "new" money to enter the economy. Basic industries allow an economy to grow.

Diversity Analysis

Using IMPLAN employment and income reports, forest planners illustrated the relative importance of major sectors and industries, such as wood products, and tourism. Employment, industrial output, and labor income to workers and proprietors were contrasted to the total for the entire forest economy to gauge the percentage relationship between the two. Using IMPLAN models from two years (1990 and 2000) a change in economic characteristics is illustrated. The Shannon Weaver Entropy Indexes were also used to show relative diversity of counties, and the state.

Forest Contribution and Economic Impact Analyses

An impact analysis describes what happens when a change in final demand sales occurs for goods and services in the model region. Changes in final demand sales are the result of multiplying production data (e.g., head months of grazing or recreation visitor trips) times sales. Economic impacts were estimated for 2005, using the expenditure data for recreation, wildlife and hunting (U.S. Forest Service's National Visitor Use and Monitoring data) stumpage estimates for timber, market prices for minerals, and estimated animal allotment prices for Range. NVUM data were used by Daniel J. Stynes and Eric White, Michigan State University, July 2002 to estimate spending profiles of recreation users.

Impacts to local economies are measured in two ways: employment and labor income. Employment is expressed in jobs. A job can be seasonal or year-round, fulltime, or part time. Labor income includes both employee compensation (pay plus benefits) and proprietor's income (i.e. self employed).

Data Sources

The IMPLAN model was used to determine economic (employment and labor income) consequences in selected sectors. Because input/output models are linear, multipliers or response coefficients need only be calculated once per model and then applied to the direct change in final demand. A Forest Service developed spreadsheet known as "FEAST" (Forest Economic Analysis Spreadsheet Tool) was used to organize the resource data by alternative and IMPLAN response coefficients to derive the economic consequences by alternative and resource. In other words, FEAST uses the response coefficients from IMPLAN and the resource data by alternative to estimate the economic consequences. Levels of dollar activity by alternative are stated in Table B.11.

Table B.11 Budget and Employment Data Used for the FEAST Model

Resource	Units	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E
Recreation	M \$	1,675	1,675	1,675	1,675	1,675
Timber	M \$	7,645	7,610	7,812	7,597	7,602
SWA	M \$	633	633	633	633	633
Range	M \$	140	140	140	140	140
Minerals	M \$	201	201	201	201	201
Wildlife & Fish	M \$	1,940	1,940	1,940	1,940	1,940
Protection (includes Fire, EM, Lands, Engineering)	M \$	10,515	10,655	11,335	10,747	10,869
Forest Service Employment						
Permanent	Persons	300	300	300	300	300
Other than Permanent	Persons	75	75	75	75	75

Timber

Sales Data: Timber revenue was estimated by using timber stumpage values (\$ per CCF) multiplied by estimated production harvest levels for each alternative.

Use of the Model: Hardwood and softwood sawtimber are processed through the sawmill industry. Hardwood and softwood round wood are assumed to be processed at the pulp mill. In the absence of a pulp mill in the local economy, round wood is assumed to be exported out of the analysis area. Impacts represent the economic activity occurring in all sectors and supporting components associated with the final demand output of the timber industries described above. For the Ouachita National Forest, pulp mills do not exist in the analysis area. Therefore, it was assumed that round wood was exported out of the impact area.

Range

Sales Data: The best available data for agriculture is found in the *2002 Census of Agriculture*. From this census, data for county level inventory and animals sold were used. This information was used to estimate the market value of animals sold in the local economy (total sales) and the proportion that was attributable to the Forest Service. Animal months of grazing on forest land were provided by alternative by the resource specialists. This unit of use information was placed in FEAST to link with IMPLAN impact response coefficients to yield an impact for the range resource per unit of grazing (AUM).

Recreation Wildlife & Fish

Expenditure Data: Recreation and Wildlife and Hunting trips were derived from the 2001 National Visitor Use and monitoring survey (NVUM). The NVUM survey is conducted for one quarter of the national forests each year. The resulting calculations yielded trips for local and non-local Day use, on National Forest Overnight use, and off National Forest Overnight Use. These use metrics were entered into FEAST to link with IMPLAN impact response coefficients to yield an impact for recreation and wildlife resources.

While some analysts may not include resident (people within 50 miles of the impact area) participation in local economy impacts because there may be substitution opportunities for local residents to spend their discretionary dollar, we decided to include resident expenditures in the local economy with the caveat that these expenditures were “associated” with the impacts not “responsible” for causing the impacts. The logic for making this statement is that local recreation users have many choices for their recreation expenditures. If some people choose not to recreate on national forest land, they may recreate in another manner such as go to sporting events or a movie. The dollars would still be spent in the local economy causing a similar impact, but the provider of recreation would be a different party.

Federal Expenditures & Employment

Forest Service Expenditure Data: Planners applied budget constraints to every alternative. This budget constraint was also used to help estimate the total forest expenditures (salary and non-salary), some of which had local economic effects. Budget object codes, from the National Finance Center, for 2002-2004 were averaged and used to constrain total forest expenditures. The proportion of funds spent by resource programs varies by the alternative according to the theme for that alternative. Forest Service employment was estimated by the forest staff based on examination of historical Forest Service obligations.

Use of the Model: To obtain an estimate of economic impacts related to Forest Service spending, salary and non-salary portions of the impact were handled separately. Non-salary expenditures were determined by using the budget object code information noted above. This spending profile was run through the model for non-salary expenditures to develop response coefficients (jobs and income) per one million dollars, and the results multiplied by total forest non-salary expenditures. FEAST was again used to perform these calculations. Local sales to the federal government are treated in the same manner as exports.

IMPLAN includes a profile of personal consumption expenditures for several income categories; the average compensation for an employee on the Ouachita National Forest fell in the category of \$30,000-\$39,999. An IMPLAN profile for this spending range was used to estimate the economic effects.

Revenue Sharing – 25% Fund Payments

Expenditure Data: Until September 30, 2001, Federal law required that 25 percent of all gross revenues from national forest activities be returned to States and counties in which those national forest lands exist. Twenty-Five Percent Fund Payments were applied to schools and roads according to state laws. An IMPLAN profile of expenditures was developed from within the county forest boundary model for 1) the highway construction sector and 2) local educational institutions. Because counties *may* choose to continue payments under the older formula, traditional payments were analyzed (we assumed 25 percent of payments went to roads and 75 percent to education). For those counties that choose or remain on “full payments” under the 2000 law, the Secure Rural Schools and Community Self-Determination Act, the impacts would not vary by alternative. The impact of the fixed payment was not calculated.

Use of the Model: The national expenditure profile for state/local government education (schools) and local model estimates for road construction (roads) are provided within IMPLAN. An IMPLAN project consisting of these two sectors was developed. The IMPLAN project was used to estimate a response coefficient (jobs and labor income per \$1 million of 25% fund payments). These response coefficients were loaded into FEAST and linked to the estimated 25% fund payments by alternative to estimate employment and labor income effects.

Output Levels

Output levels for each item listed previously can be viewed in various Forest FEAST spreadsheets files contained in the administrative record. These amounts are also located in the corresponding resource sections of the FEIS.

Present Net Value

The 1982 National Forest Management Act (NFMA) implementing regulations (36 CFR 219.1) state that forest plans must "...provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes long term net public benefits in an environmentally sound manner." Net public benefits is defined as the overall value to the Nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not.

Present net value (PNV) is one of the criteria used to determine net public benefits (NPB) in benchmarks and alternatives. It is the difference between the discounted value of all outputs which were assigned a price in the revision and all Forest Service management and investment costs over the analysis period. The PNV converts all costs and benefits over the 50 year planning period to a common point in time. Other benefits of public land management cannot be measured using dollar values. These non-priced benefits are another criteria used to determine NPB.

Each alternative was determined and analyzed to achieve its goals and objectives in a manner that produced the greatest PNV while meeting all specified costs and objectives for non-priced benefits. Thus, the PNV of each alternative estimated the value of priced benefits while accounting for the costs of producing priced benefits, non-priced benefits, and meeting management requirements. The PNV of each alternative can then be compared directly (See Table 3.95 in the FEIS for values by Alternative).

Financial and Economic Efficiency Analysis

Financial efficiency is defined as how well the dollars invested in each alternative produce revenues to the agency. Economic efficiency is defined as how well the dollars invested in each alternative produce benefits to society. Present Net Value (PNV) is used as an indicator of financial and economic efficiency.

The Ouachita National Forest used a Microsoft Office Excel electronic spreadsheet to calculate PNV for each alternative over a 50-year period. A four percent real discount rate, prescribed by Forest Service Handbook (FSH) 1909.17, was used. Decadal and 50 year cumulative present values for program benefits and costs as well as present net values are the product of this spreadsheet. For each decade, an average annual resource value was estimated; an annuity was created for the decade, discounted from the mid-point of the decade to the first year of the decade; and then each decade annuity was discounted to 2005.

The financial values for range came from RPA estimates and updated to 2005 dollars; for timber from average stumpage prices provided by the Forest; for minerals from market prices for minerals from the Minerals Management Service; and prices for recreation and wildlife from RPA updated to 2005 dollars and transformed to NVUM unit measurements. As shown in Table B.12, all values are in 2005 constant dollars.

Table B.12 Display of the Economic Values Were Used for Each Resource

Economic Benefits and Financial Revenue Values (in 2005 Dollars)	
Range (\$/AUM)	
Cattle/Horses	4.53
Timber (\$/MCF):	
Sawtimber Softwood	1,199.47
Sawtimber Hardwood	366.15
Roundwood Softwood	70.64
Roundwood Hardwood	13.66
Minerals:	
Dimension Stone (\$/Metric Ton)	6.00
Crushed Stone (\$/Metric Ton)	3.37
Limestone (\$/Metric Ton)	NA
Clay (\$/Ton)	NA
Petroleum (\$/Barrel)	NA
Natural Gas (\$/ thousand cubic meter)	156.44
Recreation (\$/Visit):	
Camping, Picnicking, Swim.	9.66
Mech. Travel, Viewing Scenery	7.50
Hiking, Horseback Riding, Water Travel	3.37
Winter Sports	40.61
Wilderness (backpacking)	20.80
Other	60.25
Wildlife (\$/Visit):	
Hunting	32.36
Fishing	64.19
Wildlife Watching	38.56

Timber values are based on Forest harvest values; Recreation and Wildlife are values based on non-market values in the USDA Forest Service "Resource Pricing and Valuation Procedures for the Recommended 1990 RPA Program"; Mineral value taken from local forest price information and historical prices from the U.S. Minerals Management Service

Demographic and Economic Data Reviewed for this Analysis

Table B.13 and the following tables summarize census and economic data for the Forest impact area (counties with National Forest System land) and the States of Arkansas and Oklahoma. The term "Boundary Counties," which appears in many of the following tables, refers to counties that include lands of the Ouachita National Forest.

Table B.13 Ouachita National Forest Counties Total Population, 1980–2000 (Source: U.S. Bureau of Census)

Area Name	1980	1990	1980-90 % Increase	2000	1990-2000 % Increase
Arkansas	2,286,435	2,350,725	2.81	2,673,400	13.73
Ashley	26,538	24,319	-8.36	24,209	-0.45
Garland	70,531	73,397	4.06	88,068	19.99
Hot Spring	26,819	26,115	-2.63	30,353	16.23
Howard	13,459	13,569	0.82	14,300	5.39
Logan	20,144	20,557	2.05	22,486	9.38
Montgomery	7,771	7,841	0.90	9,245	17.91
Perry	7,266	7,969	9.68	10,209	28.11
Pike	10,373	10,086	-2.77	11,303	12.07
Polk	17,007	17,347	2.00	20,229	16.61
Saline	53,161	64,183	20.73	83,529	30.14
Scott	9,685	10,205	5.37	10,996	7.75
Sebastian	95,172	99,590	4.64	115,071	15.54
Yell	17,026	17,759	4.31	21,139	19.03
Oklahoma	3,025,290	3,145,585	3.98	3,450,654	9.70
LeFlore	40,698	43,270	6.32	48,109	11.18
McCurtain	36,151	33,433	-7.52	34,402	2.90
Forest Total	451,801	469,640	3.95	543,648	15.76

Table B.14 Ouachita National Forest Boundary Counties Population Characteristics, 1980–2000 (Source: US Bureau of Census)

County	Title	1980	% of Total	1990	% of Total	2000	% of Total
Ashley	Population Black	7,237	27.27	6,631	27.27	6,561	27.10
	Population White	19,230	72.46	17,483	71.89	16,892	69.78
	Other	71	0.27	205	0.84	756	3.12
	Total Minority	7,308	27.54	6,836	28.11	7,317	30.22
	Total Population	26,538		24,319		24,209	
Garland	Population Black	5,756	8.16	5,562	7.58	6,873	7.80
	Population White	64,106	90.89	66,893	91.14	78,250	88.85
	Other	669	0.95	942	1.28	2,945	3.34
	Total Minority	6,425	9.11	6,504	8.86	9,818	11.14
	Total Population	70,531		73,397		88,068	
Hot Spring	Population Black	3,014	11.24	2,875	11.01	3,115	10.26
	Population White	23,626	88.09	23,026	88.17	26,508	87.33
	Other	179	0.67	214	0.82	730	2.41
	Total Minority	3,193	11.91	3,089	11.83	3,845	12.67
	Total Population	26,819		26,115		30,353	
Howard	Population Black	2,486	18.47	2,917	21.50	3,126	21.86
	Population White	10,858	80.67	10,590	78.05	10,525	73.60
	Other	115	0.85	62	0.46	649	4.54
	Total Minority	2,601	19.32	2,979	21.96	3,775	26.40
	Total Population	13,459		13,569		14,300	
Logan	Population Black	307	1.52	255	1.24	236	1.05
	Population White	19,630	97.45	20,004	97.31	21,690	96.46
	Other	207	1.03	298	1.45	560	2.49
	Total Minority	514	2.55	553	2.69	796	3.54
	Total Population	20,144		20,557		22,486	
Montgomery	Population Black	11	0.14	2	0.03	27	0.29
	Population White	7,688	98.93	7,727	98.55	8,822	95.42
	Other	72	0.93	112	1.43	396	4.28
	Total Minority	83	1.07	114	1.46	423	4.57
	Total Population	7,771		7,841		9,245	
Perry	Population Black	133	1.83	165	2.07	177	1.73
	Population White	7,098	97.69	7,730	97.00	9,762	95.62
	Other	35	0.48	74	0.93	270	2.64
	Total Minority	168	2.31	239	3.00	447	4.37
	Total Population	7,266		7,969		10,209	
Pike	Population Black	414	3.99	396	3.93	392	3.47
	Population White	9,907	95.51	9,650	95.68	10,403	92.04
	Other	52	0.50	40	0.40	508	4.49
	Total Minority	466	4.49	436	4.33	900	7.96
	Total Population	10,373		10,086		11,303	
Polk	Population Black	2	0.01	0	0.00	32	0.16
	Population White	16,837	99.00	17,063	98.36	19,155	94.69
	Other	168	0.99	284	1.64	1,042	5.15
	Total Minority	170	1.00	284	1.64	1,074	5.31
	Total Population	17,007		17,347		20,229	

County	Title	1980	% of Total	1990	% of Total	2000	% of Total
Saline	Population Black	1,458	2.70	1,294	2.00	1,838	2.20
	Population White	51,361	96.60	62,148	96.80	79,575	95.30
	Other	342	0.60	741	1.20	2,116	2.50
	Total Minority	1,800	3.30	2,035	3.20	3,954	4.70
	Total Population	53,161		64,183		83,529	
Scott	Population Black	2	0.02	0	0.00	25	0.23
	Population White	9,585	98.97	10,023	98.22	10,285	93.53
	Other	98	1.01	182	1.78	686	6.24
	Total Minority	100	1.03	182	1.78	711	6.47
	Total Population	9,685		10,205		10,996	
Sebastian	Population Black	4,916	5.17	5,597	5.62	7,086	6.16
	Population White	87,566	92.01	88,686	89.05	94,745	82.34
	Other	2,690	2.83	5,307	5.33	13,240	11.51
	Total Minority	7,606	8.00	10,904	10.95	20,326	17.67
	Total Population	95,172		99,590		115,071	
Yell	Population Black	352	2.07	394	2.22	310	1.47
	Population White	16,551	97.21	17,071	96.13	18,312	86.63
	Other	123	0.72	294	1.66	2,517	11.91
	Total Minority	475	2.79	688	3.88	2,827	13.38
	Total Population	17,026		17,759		21,139	
LeFlore	Population Black	983	2.42	1,111	2.57	1,065	2.21
	Population White	36,340	89.29	36,885	85.24	38,657	80.35
	Other	3,375	8.29	5,274	12.19	8,387	17.43
	Total Minority	4,358	10.71	6,385	14.76	9,452	19.64
	Total Population	40,698		43,270		48,109	
McCurtain	Population Black	3,849	10.65	3,437	10.28	3,200	9.30
	Population White	28,402	78.56	24,899	74.47	24,267	70.54
	Other	3,900	10.79	5,097	15.25	6,935	20.16
	Total Minority	7,749	21.44	8,534	25.53	10,135	29.46
	Total Population	36,151		33,433		34,402	
Forest Total	Population Black	30,920	6.84	30,636	6.52	34,063	6.27
	Population White	408,785	90.48	419,878	89.40	467,848	86.06
	Other	12,096	2.68	19,126	4.07	41,737	7.68
	Total Minority	43,016	9.52	49,762	10.59	75,800	13.95
	Total Population	451,801		469,640		543,648	
Arkansas Total	Black Population	373,768	16.35	373,454	15.89	418,950	15.67
	White Population	1,890,322	82.68	1,944,393	82.71	2,138,598	80.00
	Other	22,345	0.98	32,878	1.40	115,852	4.33
	Total Minority	396,113	17.33	406,332	17.29	534,802	20.00
	Total Population	2,286,435		2,350,725		2,673,400	
Oklahoma Total	Black Population	204,674	6.77	232,244	7.68	260,968	8.63
	White Population	2,597,791	85.87	2,587,439	85.53	2,628,434	86.88
	Other	222,825	7.37	325,902	10.77	561,252	18.55
	Total Minority	427,499	14.13	558,146	18.45	822,220	27.18
	Total Population	3,025,290		3,145,585		3,450,654	

Table B.15 Ouachita National Forest Boundary Counties Population per Square Mile, 1990–2000 (Source: US Bureau of Census)

County	1990 Density	1990 Population	1990 Weighted Avg.	2000 Density	2000 Population	2000 Weighted Avg.
Ashley	26.4	24,319	642,022	26.3	24,209	636,697
Garland	108.2	73,397	7,941,555	130.0	88,068	11,448,840
Hot Spring	42.5	26,115	1,109,888	49.4	30,353	1,499,438
Howard	23.1	13,569	313,444	24.3	14,300	347,490
Logan	29	20,557	596,153	31.7	22,486	712,806
Montgomery	10	7,841	78,410	11.8	9,245	109,091
Perry	14.5	7,969	115,551	18.5	10,209	188,867
Pike	16.7	10,086	168,436	18.7	11,303	211,366
Polk	20.2	17,347	350,409	23.5	20,229	475,382
Saline	88.6	64,183	5,686,614	115.5	83,529	9,647,600
Scott	11.4	10,205	116,337	12.3	10,996	135,251
Sebastian	185.7	99,590	18,493,863	214.6	115,071	24,694,237
Yell	19.1	17,759	339,197	22.8	21,139	481,969
LeFlore (OK)	27.3	43,270	1,181,271	30.3	48,109	1,457,703
McCurtain (OK)	18	33,433	601,794	18.6	34,402	639,877
Forest Total		469,640	37,734,943		543,648	52,686,612
Forest Weighted Average	80.3			96.9		
Arkansas	45.1			51.3		
Oklahoma	45.8			50.3		

Table B.16 Ouachita National Forest Boundary Counties Percent Rural Population, 1980 (Source: USDA Forest Service)

County	1980 Percent	1980 Population	1980 Weighted Avg.
Ashley	48.7	26,538	12,925
Garland	45.5	70,531	32,075
Hot Spring	62.1	26,819	16,656
Howard	66.2	13,459	8,905
Logan	61.7	20,144	12,435
Montgomery	100.0	7,771	7,771
Perry	100.0	7,266	7,266
Pike	100.0	10,373	10,373
Polk	69.7	17,007	11,853
Saline	58.4	53,161	31,035
Scott	72.7	9,685	7,043
Sebastian	17.1	95,172	16,320
Yell	78.7	17,026	13,405
LeFlore (OK)	62.4	40,698	25,390
McCurtain (OK)	67.9	36,151	24,564
Forest Weighted Avg.	52.7	451,801	238,016
Arkansas	48.4	2,286,435	1,106,879
Oklahoma	32.7	3,025,290	990,208

Table B.17 Ouachita National Forest Boundary Counties Percent Rural Population, 1990 (Source: USDA Forest Service)

County	1990 Percent	1990 Population	1990 Weighted Avg.
Ashley	47.6	24,319	11,588
Garland	41.8	73,397	30,689
Hot Spring	64.5	26,115	16,838
Howard	65.8	13,569	8,930
Logan	63.6	20,557	13,079
Montgomery	100.0	7,841	7,841
Perry	100.0	7,969	7,969
Pike	100.0	10,086	10,086
Polk	68.4	17,347	11,872
Saline	51.4	64,183	33,005
Scott	70.4	10,205	7,181
Sebastian	18.8	99,590	18,733
Yell	79.0	17,759	14,037
LeFlore (OK)	66.0	43,270	28,572
McCurtain (OK)	67.3	33,433	22,515
Forest Weighted Avg.	51.7	469,640	242,935
Arkansas	46.5	2,350,725	1,092,527
Oklahoma	32.3	3,145,585	1,015,502

Table B.18 Ouachita National Forest Boundary Counties Percent Rural Population, 2000 (Source: USDA Forest Service)

County	2000 Percent	2000 Population	2000 Weighted Avg.
Ashley	50.9	24,209	12,317
Garland	36.7	88,068	32,311
Hot Spring	69.9	30,353	21,225
Howard	66.2	14,300	9,471
Logan	71.2	22,486	16,000
Montgomery	100.0	9,245	9,245
Perry	100.0	10,209	10,209
Pike	100.0	11,303	11,303
Polk	74.3	20,229	15,040
Saline	49.7	83,529	41,540
Scott	72.9	10,996	8,018
Sebastian	21.0	115,071	24,126
Yell	81.3	21,139	17,177
LeFlore (OK)	69.3	48,109	33,322
McCurtain (OK)	70.8	34,402	24,344
Forest Weighted Avg.	52.5	543,648	285,648
Arkansas	47.6	2,673,400	1,271,560
Oklahoma	34.7	3,450,654	1,196,088

Table B.19 Ouachita National Forest Boundary Counties Per Capita Income, 1990–2000 (Source: US Bureau of Census)

County	1990 Per Capita Income	1990 Per Capita Income in 2000 \$'s	2000 Per Capita Income	1990-2000 % Real Average Annual Change
Ashley	9,696	12,799	15,702	2.1
Garland	11,873	15,672	18,631	1.7
Hot Spring	9,164	12,096	15,216	2.3
Howard	9,563	12,623	15,586	2.1
Logan	8,283	10,934	14,527	2.9
Montgomery	8,343	11,013	14,668	2.9
Perry	8,848	11,679	16,216	3.3
Pike	9,220	12,170	15,385	2.4
Polk	8,884	11,727	14,063	1.8
Saline	11,677	15,414	19,214	2.2
Scott	8,360	11,035	13,609	2.1
Sebastian	12,361	16,317	18,424	1.2
Yell	9,400	12,408	15,383	2.2
LeFlore (OK)	8,752	11,553	13,737	1.7
McCurtain (OK)	8,291	10,944	13,693	2.3
Forest Weighted Avg.	9,647	12,559	15,737	2.3
Arkansas	10,520	13,886	16,904	2.0
Oklahoma	11,893	15,699	17,646	1.2

Table B.20 Ouachita NF Boundary Counties Unemployment Rate, 1995–2001 (Source: US Bureau of Census)

County	1995	1996	1997	1998	1999	2000	2001
Ashley	5.9	6.8	7.6	9.3	8.1	7.3	9.1
Garland	5.0	4.9	4.6	5.1	4.5	3.9	4.3
Hot Spring	4.9	5.0	5.7	6.0	4.3	4.8	6.0
Howard	4.5	5.9	5.7	6.0	5.3	4.5	5.5
Logan	4.9	5.0	4.9	6.3	5.2	4.1	5.4
Montgomery	3.8	4.2	3.8	4.3	3.6	3.5	4.2
Perry	6.4	6.5	7.2	7.7	6.1	7.1	7.2
Pike	4.9	5.9	5.4	5.1	4.7	5.1	5.5
Polk	3.7	4.6	4.7	4.0	3.8	3.9	4.4
Saline	2.6	2.9	3.1	3.0	2.6	2.9	3.3
Scott	3.1	3.4	3.0	3.5	2.6	2.9	3.5
Sebastian	4.6	5.0	4.5	4.4	3.4	3.3	4.0
Yell	3.6	3.6	4.3	4.7	3.9	4.0	3.3
LeFlore (OK)	7.5	6.8	6.9	7.8	5.4	4.4	5.8
McCurtain (OK)	9.4	9.2	9.2	8.6	6.5	6.0	6.3
Forest Weighted Avg.	5.5	5.6	5.6	5.9	4.7	4.4	5.1
Arkansas	4.9	5.4	5.3	5.5	4.5	4.4	5.1
Oklahoma	4.7	4.1	4.1	4.5	3.4	3.0	3.8

Table B.21 Ouachita NF Boundary Counties Percent of Individuals in Poverty, 1980–2000
(Source: US Bureau of Census)

County	1980 Percent Poverty	1980 Population	1990 Percent Poverty	1990 Population	2000 Percent Poverty	2000 Population
Ashley	20.9	26,538	20.9	24,319	17.5	24,209
Garland	15.5	70,531	18.0	73,397	14.6	88,068
Hot Spring	16.9	26,819	18.6	26,115	14.0	30,353
Howard	16.1	13,459	18.6	13,569	15.5	14,300
Logan	22.3	20,144	19.3	20,557	15.4	22,486
Montgomery	22.7	7,771	23.8	7,841	17.0	9,245
Perry	16.7	7,266	20.3	7,969	14.0	10,209
Pike	18.5	10,373	17.9	10,086	16.8	11,303
Polk	23.0	17,007	18.5	17,347	18.2	20,229
Saline	9.6	53,161	9.3	64,183	7.2	83,529
Scott	23.9	9,685	21.9	10,205	18.2	10,996
Sebastian	13.3	95,172	13.1	99,590	13.6	115,071
Yell	19.8	17,026	17.1	17,759	15.4	21,139
LeFlore (OK)	20.1	40,698	22.5	43,270	19.1	48,109
McCurtain (OK)	24.1	36,151	30.2	33,433	24.7	34,402
Total		451,801		469,640		543,648
Forest Weighted Avg.	17.0		17.5		14.8	
Arkansas	19.0		19.0		16.0	
Oklahoma	13.4		16.7		14.7	

Table B.22 Ouachita NF Boundary Counties Total Transfer Payments, 1970–1991
(2000 \$'s*) (Source: U.S. Bureau of Census)

Area Name	1970	1975	1980	1985	1990	1991
	\$					
Ashley, AR	36,115	58,992	68,888	74,003	78,547	83,397
Garland, AR	116,346	201,494	226,828	660,911	323,932	345,212
Hot Spring, AR	35,453	71,210	71,560	202,358	90,733	95,337
Howard, AR	19,225	34,214	39,056	102,762	46,344	48,215
Logan, AR	32,931	60,013	72,111	185,161	81,608	86,747
Montgomery, AR	11,096	17,757	20,816	60,109	27,550	28,864
Perry, AR	10,909	19,802	21,214	58,867	27,526	28,767
Pike, AR	15,829	25,293	28,010	77,988	33,655	36,505
Polk, AR	27,231	44,992	51,475	143,362	62,497	65,835
Saline, AR	38,544	105,578	119,013	341,677	175,874	188,536
Scott, AR	14,457	24,870	27,214	69,821	33,480	35,012
Sebastian, AR	113,668	210,579	243,364	613,191	302,446	313,874
Yell, AR	24,606	44,358	52,171	137,732	59,638	64,067
LeFlore, OK	79,560	113,021	123,822	364,549	153,158	160,797
McCurtain, OK	65,907	96,538	101,819	269,260	119,618	124,971
Forest County Total	641,877	1,128,710	1,267,359	3,467,207	1,616,605	1,706,136
Arkansas Total	3,022,006	5,262,227	6,029,362	16,515,775	7,598,406	7,972,411
Oklahoma Total	4,356,595	6,564,989	7,126,704	20,617,827	9,399,962	9,754,696

*Nominal data converted to 2000 \$'s by the Consumer Price Index Price Deflators

Table B.23 Ouachita NF Boundary Counties Total Transfer Payments, 1992–1997
(2000 \$'s*) (Source: U.S. Bureau of Census)

Area Name	1992	1993	1994	1995	1996	1997
	\$					
Ashley, AR	93,709	97,316	97,861	101,989	103,898	105,884
Garland, AR	380,942	398,411	399,358	417,573	426,180	441,326
Hot Spring, AR	104,619	109,186	107,743	114,229	116,082	121,341
Howard, AR	52,130	53,451	54,117	55,992	57,849	59,413
Logan, AR	90,688	91,574	91,792	95,157	110,513	108,637
Montgomery, AR	31,553	32,662	33,475	35,169	36,192	37,496
Perry, AR	32,809	33,009	34,668	35,311	36,895	37,696
Pike, AR	39,267	40,694	40,355	42,441	42,530	43,380
Polk, AR	71,954	75,260	76,996	80,794	82,240	84,778
Saline, AR	204,427	214,315	227,300	237,420	278,900	269,573
Scott, AR	37,795	38,919	39,120	41,934	43,291	45,586
Sebastian, AR	347,259	359,147	363,662	380,465	389,011	397,159
Yell, AR	70,750	74,181	73,406	76,480	78,066	80,469
LeFlore, OK	179,252	179,375	184,797	195,393	199,119	192,987
McCurtain, OK	138,418	136,081	142,878	149,598	150,303	134,599
Forest County Total	1,875,570	1,933,582	1,967,529	2,059,946	2,151,068	2,160,325
Arkansas Total	8,713,807	9,024,652	9,151,554	9,580,467	9,828,807	10,042,695
Oklahoma Total	10,671,642	10,846,262	11,223,664	11,651,966	11,849,960	11,874,443

*Nominal data converted to 2000 \$'s by the Consumer Price Index Price Deflators

Table B.24 Ouachita NF Boundary Counties Total Transfer Payments, 1998–2000
(2000 \$'s*) (Source: U.S. Bureau of Census)

Area Name	1998	1999	2000	Real Average Rate of Change (%)
	\$			
Ashley, AR	107,467	106,195	106,015	3.7
Garland, AR	450,974	444,441	448,440	4.6
Hot Spring, AR	123,303	122,602	123,396	4.2
Howard, AR	59,573	58,492	58,466	3.8
Logan, AR	104,301	105,049	105,906	4.0
Montgomery, AR	38,672	39,730	40,848	4.4
Perry, AR	38,056	37,565	39,638	4.4
Pike, AR	44,320	44,625	44,711	3.5
Polk, AR	85,326	84,724	85,404	3.9
Saline, AR	265,717	275,417	292,886	7.0
Scott, AR	46,026	44,903	45,888	3.9
Sebastian, AR	402,618	403,023	410,791	4.4
Yell, AR	82,637	81,822	82,423	4.1
LeFlore, OK	196,062	200,227	199,643	3.1
McCurtain, OK	135,478	136,129	135,579	2.4
Forest County Total	2,180,528	2,184,942	2,220,034	4.2
Arkansas Total	10,196,103	10,201,767	10,382,800	4.2
Oklahoma Total	12,134,895	12,377,425	12,770,090	3.6

*Nominal data converted to 2000 \$'s by the Consumer Price Index Price Deflators

Table B.25 Ouachita National Forest Boundary Counties Female Head of Households with Children Present, 2000 (Source: U.S. Bureau of Census)

Area Name	1990 Households	1990 Female Head of Household Children Present	1990 Households with Female Head of Household (%)	2000 Households	2000 Female Head of Household Children Present	2000 Households with Female Head of Household (%)
Ashley County	8,886	528	5.9	9,384	718	7.7
Garland County	30,823	1,596	5.2	37,813	2,258	6.0
Hot Spring County	10,148	554	5.5	12,004	742	6.2
Howard County	5,032	330	6.6	5,471	413	7.5
Logan County	7,665	407	5.3	8,693	512	5.9
Montgomery County	3,079	121	3.9	3,785	132	3.5
Perry County	3,109	113	3.6	3,989	205	5.1
Pike County	3,872	112	2.9	4,504	214	4.8
Polk County	6,840	228	3.3	8,047	402	5.0
Saline County	23,032	1,064	4.6	31,778	1,890	5.9
Scott County	3,934	141	3.6	4,323	223	5.2
Sebastian County	39,349	2,059	5.2	45,300	3,238	7.1
Yell County	6,941	349	5.0	7,922	484	6.1
LeFlore County, OK	12,130	883	7.3	17,861	1,071	6.0
McCurtain County, OK	9,323	1,009	10.8	13,216	1,181	8.9
Forest County Total	174,163	9,494	5.5	214,090	13,683	6.4
Oklahoma Total	1,207,235	74,167	6.1	1,342,293	94,403	7.0
Arkansas Total	891,665	55,835	6.3	1,042,696	76,774	7.4

Table B.26 Ouachita National Forest Counties Average Household Size, 2000 (Source: U.S. Bureau of Census)

Area Name	1990 Average Household Size	2000 Average Household Size
Ashley County	2.7	2.6
Garland County	2.4	2.3
Hot Spring County	2.6	2.5
Howard County	2.7	2.6
Logan County	2.7	2.5
Montgomery County	2.5	2.4
Perry County	2.6	2.5
Pike County	2.6	2.5
Polk County	2.5	2.5
Saline County	2.8	2.6
Scott County	2.6	2.5
Sebastian County	2.5	2.5
Yell County	2.6	2.6
LeFlore County, OK	3.6	2.6
McCurtain County, OK	3.6	2.6
Forest County Average	2.7	2.5
Oklahoma Average	2.6	2.5
Arkansas Average	2.6	2.5

Table B.27 Ouachita NF Boundary Counties Housing Units and Vacancies, 1990–2000**(Source: US Bureau of Census)**

Area Name	1990 Total Number of Units	1990 Number of Vacant Units	1990 Vacant Units (%)	2000 Total Number of Units	2000 Number of Vacant Units	2000 Vacant Units (%)	1990-2000 Change in Housing Units (%)
Ashley County	9,820	884	9.00	10,615	1,274	12.00	8.1
Garland County	37,966	7,214	19.00	44,953	7,192	16.00	18.4
Hot Spring County	11,378	1,252	11.00	13,384	1,338	10.00	17.6
Howard County	5,600	616	11.00	6,297	819	13.00	12.4
Logan County	8,539	939	11.00	9,942	1,292	13.00	16.4
Montgomery County	4,269	1,195	28.00	5,048	1,262	25.00	18.2
Perry County	3,702	629	17.00	4,702	705	15.00	27.0
Pike County	4,550	683	15.00	5,536	1,052	19.00	21.7
Polk County	7,732	928	12.00	9,236	1,201	13.00	19.5
Saline County	24,602	1,476	6.00	33,825	2,030	6.00	37.5
Scott County	4,485	538	12.00	4,924	591	12.00	9.8
Sebastian County	43,621	4,362	10.00	49,311	3,945	8.00	13.0
Yell County	7,868	944	12.00	9,157	1,190	13.00	16.4
LeFlore County, OK	18,029	2,163	12.00	20,142	2,216	11.00	11.7
McCurtain County, OK	13,828	1,659	12.00	15,427	2,160	14.00	11.6
Forest Total	205,989	25,483	12.40	242,499	28,267	11.70	17.7
Arkansas Total	1,000,667	109,488	10.90	1,173,043	130,347	11.10	17.2
Oklahoma Total	1,406,499	200,364	14.00	1,514,400	172,107	11.00	7.7

Table B.28 Ouachita NF Boundary Counties Median Housing Values, 1990–2000 (Source: U.S. Bureau of Census)

Area Name	4/1/1990 \$	1990 Value in 2000 \$'s	4/1/2000 \$	1990-2000 Percent Real Change
Ashley County	38,700	51,084	55,700	0.87
Garland County	53,000	69,960	85,900	2.07
Hot Spring County	39,500	52,140	63,100	1.93
Howard County	36,900	48,708	55,600	1.33
Logan County	33,900	44,748	54,000	1.90
Montgomery County	31,800	41,976	54,000	2.55
Perry County	33,000	43,560	58,700	3.03
Pike County	32,600	43,032	49,600	1.43
Polk County	35,700	47,124	57,100	1.94
Saline County	58,700	77,484	93,700	1.92
Scott County	31,800	41,976	48,000	1.35
Sebastian County	48,700	64,284	73,300	1.32
Yell County	37,600	49,632	60,600	2.02
LeFlore County, OK	35,300	46,596	51,600	1.03
McCurtain County, OK	29,400	38,808	44,500	1.38
Forest Average	38,440	50,741	60,360	1.75
Arkansas Average	46,000	60,720	72,800	1.83
Oklahoma Average	47,600	62,832	70,700	1.19

**Table B.29 Dependency Analysis Aggregated Local Economy for Ouachita NF, 1990–2000;
Primary Effects (Copyright MIG 2003)**

Industry	1990 (Year 2000\$'s) Industry Output*	1990 Percentage of Total	2000 Industry Output \$	2000 Percentage of Total	1990-2000 Percent Real Annual Change
Other Agriculture	1,038.6	5.4	1,072.9	4.3	0.3
Range	126.4	0.7	117.6	0.5	-0.7
Total Agriculture	1,165.0	6.1	1,190.5	4.8	0.2
Minerals	1,577.1	8.3	151.9	0.6	-20.9
Construction	1,684.7	8.8	2,136.1	8.6	2.4
Other Manufacturing	5,758.3	30.2	7,629.6	30.7	2.9
Wood Products	1,003.0	5.3	1,357.3	5.5	3.1
Pulp & Paper	1,039.2	5.4	1,178.2	4.7	1.3
Furniture & Fixtures	176.8	0.9	231.8	0.9	0.0
Total Wood Based	2,219.0	11.6	2,767.4	11.1	2.2
Total Manufacturing	7,977.3	41.8	10,396.9	41.8	2.7
Transportation & Public Utilities	1,224.4	6.4	1,575.6	6.3	2.6
Wholesale & Retail Trade	1,337.0	7.0	2,329.3	9.4	5.7
Finance, Insurance, Real Estate	1,347.4	7.1	2,397.6	9.6	5.9
Services	2,046.8	10.7	3,390.1	13.6	5.2
Government	690.2	3.6	1,315.5	5.3	6.7
Other Misc.	23.5	0.1	1.8	0.0	-22.6
Totals	19,073.5	100.0	24,885.4	100.0	2.7

**Table B.30 Dependency Analysis Aggregated Local Economy for Ouachita NF, 1990–2000;
Primary Effects (Copyright MIG 2003)**

Industry	1990 Employment	1990 Percentage of Total	2000 Employment	2000 Percentage of Total	1990-2000 Percent Real Annual Change
Other Agriculture	11,649	5.2	14,337	5.1	2.1
Range	848	0.4	3,017	1.1	13.5
Total Agriculture	12,497	5.6	17,355	6.1	3.3
Minerals	1,352	0.6	961	0.3	-3.4
Construction	19,153	8.6	22,793	8.1	1.8
Other Manufacturing	38,564	17.3	44,541	15.7	1.5
Wood Products	7,780	3.5	8,759	3.1	1.2
Pulp & Paper	4,513	2.0	3,807	1.3	-1.7
Furniture & Fixtures	2,416	1.1	2,516	0.9	0.0
Total Wood Based	14,709	6.6	15,082	5.3	0.3
Total Manufacturing	53,273	23.9	59,623	21.1	1.1
Transportation & Public Utilities	9,542	4.3	10,565	3.7	1.0
Wholesale & Retail Trade	39,394	17.7	53,102	18.8	3.0
Finance, Insurance, Real Estate	9,890	4.4	13,526	4.8	3.2
Services	48,157	21.6	70,931	25.1	3.9
Government	27,619	12.4	32,683	11.6	1.7
Other Misc.	2,160	1.0	1,370	0.5	-4.5
Totals	223,037	100.0	282,909	100.0	2.4

Table B.31 Dependency Analysis Aggregated Local Economy for Ouachita NF, 1990–2000; Primary Effects (Copyright MIG 2003)

Industry	1990 (Year 2000\$'s) Employee Compensation	1990 Percentage of Total	2000 Employee Compensation (\$)	2000 Percentage of Total	1990-2000 Percent Real Annual Change
Other Agriculture	66.0	1.4	65.9	1.0	0.0
Range	4.2	0.1	5.6	0.1	2.9
Total Agriculture	70.2	1.5	71.5	1.1	0.2
Minerals	40.2	0.8	27.2	0.4	-3.8
Construction	378.5	7.9	419.1	6.6	1.0
Other Manufacturing	1,197.6	25.1	1,355.4	21.3	1.2
Wood Products	224.8	4.7	264.6	4.2	1.6
Pulp & Paper	245.5	5.1	221.2	3.5	N/M
Furniture & Fixtures	56.2	1.2	62.0	1.0	0.0
Total Wood Based	526.5	11.0	547.9	8.6	0.4
Total Manufacturing	1,724.1	36.2	1,903.3	29.8	1.0
Trans. & Public Utilities	309.2	6.5	336.7	5.3	0.9
Wholesale & Retail Trade	661.4	13.9	937.0	14.7	3.5
Finance, Insurance, Real Estate	186.4	3.9	225.9	3.5	1.9
Services	898.0	18.8	1,418.4	22.2	4.7
Government	485.0	10.2	1,026.7	16.1	7.8
Other Misc.	15.2	0.3	10.7	0.2	-3.4
Totals	4,768.2	100.0	6,376.4	100.0	2.9

Table B.32 Dependency Analysis Aggregated Local Economy for Ouachita NF, 1990–2000; Primary Effects (Copyright MIG 2003)

Industry	1990 (2000\$'s) Proprietor Income	1990 Percentage of Total	2000 Proprietor Income (\$)	2000 Percentage of Total	1990-2000 Percent Real Annual Change
Other Agriculture	270.8	29.2	160.3	16.9	-5.1
Range	23.3	2.5	26.0	2.7	1.1
Total Agriculture	294.1	31.7	186.4	19.6	-4.5
Minerals	6.5	0.7	9.4	1.0	3.7
Construction	127.4	13.7	194.1	20.4	4.3
Other Manufacturing	18.4	2.0	36.5	3.8	7.1
Wood Products	23.2	2.5	27.2	2.9	1.6
Pulp & Paper	4.9	0.5	1.6	0.2	N/M
Furniture & Fixtures	(0.2)	0.0	2.0	0.2	0.0
Total Wood Based	27.9	3.0	30.9	3.3	1.0
Total Manufacturing	46.3	5.0	67.4	7.1	3.8
Trans. & Public Utilities	69.1	7.4	70.3	7.4	0.2
Wholesale & Retail Trade	77.0	8.3	95.3	10.0	2.2
Finance, Insurance, Real Estate	15.8	1.7	50.7	5.3	12.4
Services	292.3	31.5	275.9	29.1	-0.6
Government	0.0	0.0	0.0	0.0	0.0
Other Misc.	0.0	0.0	0.0	0.0	0.0
Totals	928.6	100.0	949.5	100.0	0.2

**Table B.33 Dependency Analysis Aggregated Local Economy for Ouachita NF, 1990–2000;
Primary Effects (Copyright MIG 2003)**

Industry	1990 (2000\$'s) Labor Income	1990 Percentage of Total	2000 Labor Income \$	2000 Percentage of Total	Percent Real Annual Change 1990-2000
Other Agriculture	336.8	5.9	226.2	3.1	-3.9
Range	27.5	0.5	31.6	0.4	1.4
Total Agriculture	364.3	6.4	257.8	3.5	-3.4
Minerals	46.7	0.8	36.6	0.5	-2.4
Construction	505.9	8.9	613.2	8.4	1.9
Other Manufacturing	1,216.1	21.3	1,391.9	19.0	1.4
Wood Products	248.0	4.4	291.9	4.0	1.6
Pulp & Paper	250.4	4.4	222.9	3.0	-1.2
Furniture & Fixtures	56.0	1.0	64.0	0.9	0.0
Total Wood Based	554.3	9.7	578.8	7.9	0.4
Total Manufacturing	1,770.4	31.1	1,970.7	26.9	1.1
Trans. & Public Utilities	378.3	6.6	407.0	5.6	0.7
Wholesale & Retail Trade	738.4	13.0	1,032.3	14.1	3.4
Finance, Insurance, Real Estate	202.2	3.5	276.6	3.8	3.2
Services	1,190.3	20.9	1,694.3	23.1	3.6
Government	485.0	8.5	1,026.7	14.0	7.8
Other Misc.	15.2	0.3	10.7	0.1	-3.4
Totals	5,696.7	100.0	7,325.9	100.0	2.5

**Table B.34 Dependency Analysis Aggregated Local Economy for Ouachita NF, 1990–2000;
Primary Effects (Copyright MIG 2003)**

Industry	1990 (2000\$'s) Other Property Income	1990 Percentage of Total	2000 Other Property Income \$	2000 Percentage of Total	1990-2000 Percent Real Annual Change
Other Agriculture	14.0	0.5	84.9	2.8	19.8
Range	1.5	0.1	4.0	0.1	10.5
Total Agriculture	15.4	0.6	88.8	2.9	19.1
Minerals	656.2	25.0	26.6	0.9	-27.4
Construction	73.4	2.8	67.7	2.2	-0.8
Other Manufacturing	597.6	22.8	527.6	17.3	-1.2
Wood Products	38.7	1.5	110.6	3.6	11.1
Pulp & Paper	106.6	4.1	133.3	4.4	N/M
Furniture & Fixtures	1.2	0.8	14.0	0.5	0.0
Total Wood Based	166.5	6.3	257.9	8.4	4.5
Total Manufacturing	764.1	29.1	785.5	25.7	0.3
Trans. & Public Utilities	267.2	10.2	243.1	8.0	-0.9
Wholesale & Retail Trade	77.6	3.0	310.1	10.1	14.9
Finance, Insurance, Real Estate	661.2	25.2	1,182.9	38.7	6.0
Services	75.9	2.9	222.7	7.3	11.4
Government	23.0	0.9	139.7	4.6	19.8
Other Misc.	8.3	0.3	(8.9)	-0.3	N/M
Totals	2,622.4	100.0	3,058.2	100.0	1.5

**Table B.35 Dependency Analysis Aggregated Local Economy for Ouachita NF, 1990–2000;
Primary Effects (Copyright MIG 2003)**

Industry	1990 (2000\$'s) Total Income	1990 Percentage of Total	2000 Total Income \$	2000 Percentage of Total	Percent Real Annual Change 1990-2000
Other Agriculture	350.7	4.2	311.1	3.0	-1.2
Range	29.0	0.3	35.6	0.3	2.1
Total Agriculture	379.7	4.6	346.7	3.3	-0.9
Minerals	702.9	8.4	63.2	0.6	-21.4
Construction	579.4	7.0	681.0	6.6	1.6
Other Manufacturing	1,813.7	21.8	1,919.5	18.5	0.6
Wood Products	286.7	3.4	402.5	3.9	3.4
Pulp & Paper	356.9	4.3	356.2	3.4	0.0
Furniture & Fixtures	77.2	0.9	78.0	0.8	0.0
Total Wood Based	720.8	8.7	836.6	8.1	1.5
Total Manufacturing	2,534.6	30.5	2,756.1	26.5	0.8
Trans. & Public Utilities	645.5	7.8	650.1	6.3	0.1
Wholesale & Retail Trade	816.1	9.8	1,342.4	12.9	5.1
Finance, Insurance, Real Estate	863.4	10.4	1,459.5	14.1	5.4
Services	1,266.2	15.2	1,917.0	18.5	4.2
Government	508.1	6.1	1,166.3	11.2	8.7
Other Misc.	23.5	0.3	1.8	0.0	-22.6
Totals	8,319.2	100.0	10,384.1	100.0	2.2

**Table B.36 Dependency Analysis Aggregated Local Economy for Ouachita NF, 1990–2000;
Primary Effects (Copyright MIG 2003)**

Industry	1990 (2000\$'s) Indirect Business Tax	1990 Percentage of Total	2000 Indirect Business Tax \$	2000 Percentage of Total	Percent Real Annual Change 1990-2000
Other Agriculture	5.9	1.0	20.7	1.7	13.3
Range	2.6	0.4	4.4	0.4	5.5
Total Agriculture	8.5	1.4	25.1	2.0	11.4
Minerals	7.7	1.3	5.2	0.4	-3.9
Construction	4.3	0.7	16.0	1.3	14.1
Other Manufacturing	40.6	6.9	76.8	6.2	6.6
Wood Products	2.0	0.3	3.5	0.3	5.9
Pulp & Paper	0.7	0.1	2.9	0.2	0.0
Furniture & Fixtures	0.4	0.1	0.2	0.0	0.0
Total Wood Based	3.1	0.5	6.6	0.5	7.9
Total Manufacturing	43.6	7.4	83.4	6.7	6.7
Trans. & Public Utilities	76.9	13.1	129.4	10.4	5.3
Wholesale & Retail Trade	232.5	39.6	658.4	52.8	11.0
Finance, Insurance, Real Estate	187.8	32.0	267.5	21.5	3.6
Services	26.2	4.5	61.2	4.9	8.8
Government	0.1	0.0	0.0	0.0	0.0
Other Misc.	0.0	0.0	0.0	0.0	0.0
Totals	587.7	100.0	1,246.1	100.0	7.8

Table B.37 Dependency Analysis Aggregated Local Economy for Ouachita NF, 1990–2000; Primary Effects (Copyright MIG 2003)

Industry	1990 (2000\$'s) Total Value Added	1990 Percentage of Total	2000 Total Value Added \$	2000 Percentage of Total	Percent Real Annual Change 1990-2000
Other Agriculture	581.6	6.3	486.9	3.2	-1.8
Range	47.5	0.5	65.8	0.4	3.3
Total Agriculture	629.1	6.8	552.7	3.6	-1.3
Minerals	94.7	1.0	59.6	0.4	-4.5
Construction	462.6	5.0	940.5	6.2	7.4
Other Manufacturing	2,405.5	26.2	2,824.1	18.6	1.6
Wood Products	71.3	0.8	120.7	0.8	5.4
Pulp & Paper	44.7	0.5	79.3	0.5	N/M
Furniture & Fixtures	30.4	0.3	9.9	0.1	0.0
Total Wood Based	146.4	1.6	209.9	1.4	3.7
Total Manufacturing	2,551.9	27.8	3,034.0	20.0	1.7
Trans. & Public Utilities	1,172.2	12.8	1,524.0	10.0	2.7
Wholesale & Retail Trade	1,319.9	14.4	3,390.4	22.3	9.9
Finance, Insurance, Real Estate	1,181.6	12.9	2,150.7	14.1	6.2
Services	1,210.8	13.2	2,097.6	13.8	5.6
Government	545.5	5.9	1,443.9	9.5	10.2
Other Misc.	\$18.2	0.2	9.8	0.1	N/M
Totals	9186.5	100.0	15,203.2	100.0	5.2

Table B.38 Ouachita National Forest Boundary Counties Shannon-Weaver Entropy Indices

County	1990 4 digit Diversity Index	1990 Employment*	Weighted Average	2000 4 digit Diversity Index	2000 Employment*	Weighted Average
Ashley, AR	0.57207	11,881	6,796.76	0.597346	12,797	7,644.24
Garland, AR	0.64753	36,015	23,320.79	0.658643	47,968	31,593.79
Hot Spring, AR	0.63076	9,655	6,089.99	0.665993	11,285	7,515.73
Howard, AR	0.53899	9,333	5,030.39	0.56539	10,963	6,198.37
Logan, AR	0.63554	8,331	5,294.68	0.625572	9,346	5,846.60
Montgomery, AR	0.57235	2,694	1,541.91	0.603336	3,760	2,268.54
Perry, AR	0.57280	2,333	1,336.34	0.6078	2,812	1,709.13
Pike, AR	0.59714	4,119	2,459.62	0.601261	4,828	2,902.89
Polk, AR	0.61921	7,937	4,914.67	0.644385	10,791	6,953.56
Saline, AR	0.63278	17,591	11,131.23	0.639973	24,511	15,686.38
Scott, AR	0.53879	4,292	2,312.49	0.550314	5,425	2,985.45
Sebastian, AR	0.68541	73,857	50,622.33	0.679215	90,251	61,299.83
Yell, AR	0.50439	8,996	4,537.49	0.551486	10,051	5,542.99
LeFlore, OK	0.62335	14,881	9,276.07	0.626879	18,462	11,573.44
McCurtain, OK	0.58363	14,044	8,196.50	0.604751	17,643	10,669.62
Total		225,959	142,861.00		280,893	180,390.56
Weighted Av.	0.632244			0.642204		
Arkansas	0.74039			0.73581		
Oklahoma	0.70993			0.71233		

*Source: U.S. BEA, REIS, Fulltime and Part Time Employment

Table B.39 Ouachita National Forest Boundary Counties Commodity Trade 1990

Industry	1990 Exports (2000 \$'s)	% of Total	1990 Imports (2000 \$'s)	% of Total	1990 Net Exports (\$) (Exports Less Imports)
Other Agriculture	245.2	3.5	259.8	3.6	-15
Range	92.8	1.3	28.4	0.4	64
Total Agriculture	338.1	4.8	288.2	4.0	50
Minerals	583.6	8.3	127.2	1.8	456
Construction	248.2	3.5	0.0	0.0	248
Wood Products	664.7	9.5	202.2	2.8	462
Furniture & Fixtures	95.7	1.4	5.3	0.1	90
Pulp & Paper	752.5	10.7	25.2	0.3	727
Other Manufacturing	3,234.9	46.1	3,123.9	43.2	111
Total Manufacturing	4,747.8	67.7	3,356.7	46.4	1,391
Transportation, & Utilities	171.4	2.4	00.7	8.3	-429
Wholesale & Retail Trade	119.7	1.7	686.3	9.5	-567
Finance, Insurance, Real Estate	294.1	4.2	963.8	13.3	-670
Services	292.9	4.2	1,007.9	13.9	-715
Government	150.5	2.1	35.8	0.5	115
Other Misc.	66.0	0.9	172.4	2.4	-106
Total In Millions of 2000 \$'s	7,012.2	100.0	7,239.0	100.0	-226.7

Table B.40 Ouachita National Forest Boundary Counties Commodity Trade 2000

Industry	2000 Exports \$	% of Total	2000 Imports \$	% of Total	2000 Net Exports \$ (Exports Less Imports)
Other Agriculture	224.9	0.0	524.2	4.0	-299.3
Range	9.9	0.0	171.8	1.3	-161.9
Total Agriculture	234.7	2.4	695.9	5.3	-461.2
Minerals	139.8	1.4	192.1	1.5	-52.2
Construction	268.5	2.7	\$1.0	0.0	267.5
Wood Products	947.8	9.6	194.8	1.5	753.0
Furniture & Fixtures	128.9	1.3	16.7	0.1	112.2
Pulp & Paper	1,026.9	10.4	255.2	2.0	771.7
Other Manufacturing	5,654.8	57.2	5,329.7	40.7	325.2
Total Manufacturing	7,758.4	78.4	5,796.3	44.3	1,962.1
Transportation, & Utilities	151.2	1.5	852.6	6.5	- 701.3
Wholesale & Retail Trade	200.5	2.0	1,432.4	11.0	- 1,232.0
Finance, Insurance, Real Estate	516.5	5.2	1,769.9	13.5	- 1,253.4
Services	515.6	5.2	2,021.1	15.5	- 1,505.5
Government	21.7	0.2	35.4	0.3	- 13.7
Other Misc.	85.0	0.9	283.3	2.2	- 198.3
Total In Millions of \$'s	9,892.0	100.0	13,080.0	100.0	- 3,188.0

Table B.41 Ouachita National Forest Boundary Counties Payments to States and Counties
(x 000 in 2003 \$'s*) (Source: USDA Forest Service)

Area Name	1985 \$'s in 2003 \$'s	1986 \$'s in 2003 \$'s	1987 \$'s in 2003 \$'s	1988 \$'s in 2003 \$'s	1989 \$'s in 2003 \$'s	1990 \$'s in 2003 \$'s	1991 \$'s in 2003 \$'s
Ashley County	3.3	3.3	2.4	3.8	2.5	1.8	1.2
Garland County	205.5	211.4	144.2	247.0	157.7	113.4	82.5
Hot Spring County	0.7	0.7	0.5	0.7	0.5	0.3	0.2
Howard County	2.4	2.5	1.8	2.8	1.9	1.3	0.9
Logan County	73.1	78.3	56.4	101.5	73.3	81.8	39.7
Montgomery County	590.5	607.4	437.6	717.3	466.3	338.9	242.8
Perry County	179.3	184.5	131.7	213.9	137.9	98.2	69.5
Pike County	4.4	4.6	3.2	5.3	4.0	2.9	2.0
Polk County	380.3	390.9	279.0	455.3	294.0	209.4	145.4
Saline County	102.6	105.5	75.3	122.3	78.9	56.1	39.1
Scott County	686.5	705.9	504.7	821.1	529.9	377.4	261.5
Sebastian County	28.6	29.4	21.0	34.1	22.0	15.6	10.9
Yell County	377.4	389.5	277.6	456.2	298.0	226.5	149.5
LeFlore County, OK	395.9	407.4	290.4	471.5	303.5	215.6	151.9
McCurtain County, OK	82.9	85.4	60.8	98.5	63.3	45.0	31.0
Forest Total	3,113.4	3,206.6	2,286.6	3,751.4	2,433.8	1,784.1	1,228.3
Arkansas	3,234.3	3,372.2	2,417.8	4,143.6	2,849.5	2,501.9	1,447.8
Oklahoma	478.9	492.7	351.2	570.0	366.9	260.6	183.0

*Deflated by GNP Price Deflator

Table B.42 Ouachita National Forest Boundary Counties Payments to States and Counties, 1992–1998 (x 000 in 2003 \$'s*) (Source: USDA Forest Service)

Area Name	1992 \$'s in 2003 \$'s	1993 \$'s in 2003 \$'s	1994 \$'s in 2003 \$'s	1995 \$'s in 2003 \$'s	1996 \$'s in 2003 \$'s	1997 \$'s in 2003 \$'s	1998 \$'s in 2003 \$'s
Ashley County	2.4	3.2	3.6	5.0	4.3	4.5	6.6
Garland County	169.0	221.4	246.0	343.7	312.2	319.9	471.0
Hot Spring County	0.5	0.6	0.7	1.0	0.8	0.8	1.3
Howard County	1.8	2.4	2.6	3.7	4.0	4.1	6.0
Logan County	69.3	96.9	108.9	148.9	135.9	173.1	179.9
Montgomery County	493.3	648.8	716.6	1,001.6	868.0	889.8	1,315.2
Perry County	141.9	187.9	210.7	294.3	256.7	263.9	389.8
Pike County	4.1	5.4	6.0	8.4	16.8	17.2	40.7
Polk County	293.2	393.2	434.2	607.3	528.9	544.9	811.0
Saline County	78.0	104.3	115.2	161.0	143.5	147.1	217.4
Scott County	525.5	707.1	780.8	1,090.9	957.9	983.3	1,453.1
Sebastian County	21.5	28.9	32.0	44.6	49.2	50.4	74.5
Yell County	294.0	396.4	439.0	612.0	532.2	561.9	793.7
LeFlore County, OK	308.4	410.4	454.6	639.5	567.7	584.0	865.0
McCurtain County, OK	62.1	83.5	92.6	129.2	327.4	347.1	513.2
Forest Total	2,465.1	3,290.5	3,643.4	5,091.1	4,705.4	4,891.9	7,138.4
Arkansas	2,795.5	3,764.6	4,197.8	5,784.7	5,241.4	5,925.8	7,407.4
Oklahoma	370.5	470.1	547.2	768.6	895.0	931.1	1,378.1

*Deflated by GNP Price Deflator

Table B.43 Ouachita National Forest Boundary Counties Payments to States and Counties, 1999–2003 (x 000 in 2003 \$'s*) (Source: USDA Forest Service)

Area Name	1999 \$'s in 2003 \$'s	2000 \$'s in 2003 \$'s	2001 \$'s in 2003 \$'s	2002 \$'s in 2003 \$'s	2003 \$'s in 2003 \$'s	Real Avg. Annual Change (%) 1985-1998
Ashley County	6.7	5.7	2.7	0.8	2.6	-1.2
Garland County	481.4	404.3	195.6	57.7	434.1	4.2
Hot Spring County	1.3	1.0	0.5	0.2	0.5	-1.4
Howard County	6.1	5.2	2.5	0.8	2.4	0.0
Logan County	74.7	63.0	44.2	39.4	40.6	-3.2
Montgomery County	1,344.0	1,133.8	1,356.3	1,211.1	1,250.7	4.3
Perry County	398.4	336.0	161.9	47.7	370.2	4.1
Pike County	41.6	35.1	16.9	5.0	16.1	7.5
Polk County	828.7	698.5	337.0	749.9	658.2	3.1
Saline County	222.2	187.3	90.3	26.7	207.7	4.0
Scott County	1,484.9	1,249.7	1,288.7	1,215.7	1,394.9	4.0
Sebastian County	76.2	64.2	66.5	59.8	61.7	4.4
Yell County	758.4	639.6	722.7	643.5	664.5	3.2
LeFlore County, OK	883.9	745.8	967.1	901.3	769.8	3.8
McCurtain Co., OK	524.4	442.5	296.3	288.2	458.6	10.0
Forest Total	7,132.9	6,011.9	5,549.4	5,247.7	6,332.6	4.0
Arkansas	8,978.5	7,558.5	7,476.0	7,192.4	8,475.0	7.7
Oklahoma	1,689.0	1,759.0	2,372.0	2,752.0		

*Deflated by GNP Price Deflator

Table B.44 Ouachita NF Boundary Counties Payments in Lieu of Taxes Payments 1991–1996* (Source: USDA Forest Service)

Area Name	1991 Funds in 2000 \$'s	1992 Funds in 2000 \$'s	1993 Funds in 2000 \$'s	1994 Funds in 2000 \$'s	1995 Funds in 2000 \$'s	1996 Funds in 2000 \$'s
Ashley County	307	1,242	1,717	1,363	1,405	1,305
Garland County	24,372	85,319	115,503	87,820	93,301	86,343
Hot Spring County	8,224	8,285	8,115	7,544	8,089	7,214
Howard County	12,272	12,930	12,892	11,877	12,832	11,470
Logan County	40,474	14,208	75,563	75,221	79,208	72,832
Montgomery County	43,407	133,954	228,178	160,184	167,686	160,243
Perry County	12,038	33,444	61,828	42,094	45,626	88
Pike County	13,815	15,732	16,064	14,598	15,615	4,128
Polk County	25,276	65,580	125,977	86,410	90,855	5,622
Saline County	6,691	17,047	32,959	27,414	23,514	191
Scott County	45,293	109,316	194,638	62,924	152,898	22,682
Sebastian County	25,617	45,543	9,276	8,392	12,377	38,552
Yell County	31,370	100,516	143,748	125,841	128,174	124,754
LeFlore County, OK	31,093	30,859	39,473	27,121	31,084	26,793
McCurtain County, OK	11,492	41,524	60,733	47,731	49,784	47,161
Forest Total	331,742	715,498	1,126,663	786,536	912,449	609,380
Arkansas	1,177,743	1,546,659	2,013,388	1,765,698	1,925,258	1,825,666
Oklahoma	984,827	963,828	977,997	885,297	960,709	943,280

*Dollars Converted to 2000 by the Consumer Price Index Deflator

Table B.45 Ouachita NF Boundary Counties Payments in Lieu of Taxes Payments 1997–2002*
Source: USDA Forest Service)

Area Name	1997 Funds in 2000 \$'s	1998 Funds in 2000 \$'s	1999 Funds in 2000 \$'s	2000 Funds in 2000 \$'s	2001 Funds in 2000 \$'s	2002 in 2000 \$'s
Ashley County	1,168	1,366	993	1,075	1,566	1,664
Garland County	81,595	3,160	104,652	123,198	141,274	150,147
Hot Spring County	6,998	7,193	10,473	14,501	14,839	15,771
Howard County	11,303	11,603	12,177	16,642	17,184	18,263
Logan County	68,566	70,604	70,615	99,957	108,049	114,836
Montgomery County	135,936	172,855	181,596	190,487	238,726	253,721
Perry County	0	0	0	50,407	64,518	68,570
Pike County	5,260	2,325	4,064	23,146	24,979	26,548
Polk County	5,464	5,592	5,926	102,030	131,100	139,335
Saline County	187	191	195	26,548	34,335	36,492
Scott County	20,339	25,199	24,184	176,519	229,179	243,574
Sebastian County	36,798	37,424	37,796	63,603	52,663	55,971
Yell County	108,825	129,552	132,421	149,116	182,168	193,610
LeFlore County, OK	28,022	26,801	28,056	39,479	40,393	0
McCurtain County, OK	105,587	75,111	75,932	65,460	93,509	99,382
Forest Total	616,119	658,977	689,079	1,142,168	1,374,481	1,417,886
Arkansas	1,687,942	1,827,144	1,906,944	2,445,372	2,723,442	2,894,507
Oklahoma	981,058	911,628	925,835	1,253,232	1,298,278	1,379,826

Dollars Converted to 2000 by the Consumer Price Index Deflator

Table B.46 Pre-Existing Project Decisions to offer Timber Sales that May not be Fully Implemented before the Revised Forest Plan goes into Effect

Caddo-Womble Ranger District		
Smith Mountain C-9, 10 & 17 C-3 & 4 Walnut Creek Silver Salvage	Sharptop C-12 C-64 Fulton Branch District-wide SPB	C-75 & 76 C-23 C-123 Joplin District-wide
Cold Springs Ranger District		
Dutch Creek Kingdoodle North Waldron Ridge Hazel Creek	Freedom Jack Pigeon Scott Side District-wide SPB	Logan Side Pilot Mountain Harvey
Fourche-Jessieville-Winona Ranger District		
C-485, 486, 518 & 519 Lower Brushy Commercial Thin (Loblolly) Forest District-wide SPB Cedar Creek West Trace Creek Huston	Little Big Cove Cedar Creek Middle North Fork District-wide Salvage Lower Lake Winona Little Bear Creek DxS Harvest	Gafford Porter Creek Crossett Exp. Irons Fork Avant Rock Creek
Mena-Oden Ranger District		
Cedar Creek Blackfork Clearfork	Little Texas Upper Fiddlers Creek	District-wide SPB Lower Brushy
Oklahoma Ranger District		
Big Creek C-1801 Panther Creek C-1814, 1815 & 1916	District-wide Salvage C-1811 Wildhorse Kiamichi	Glover C-1804 Redbank
Poteau Ranger District		
Stevens Branch East Black Fork Creek	District-wide SPB HFI Sales	Lake Hinkle

**Table B.47 Pre-Existing Project Decisions for which Timber Harvests are Complete
(but which may have other related resource actions that are not fully implemented
prior to the effective date of the Revised Forest Plan)**

Caddo-Womble Ranger District		
South Fork Williams Creek C-24 C-27	Hogjaw C-15 C-25	Mount Ida C-22 C-26
Cold Springs Ranger District		
Square Rock Right Hand Sugar Creek Jack Creek	East Newman Haletown C-203	West Newman East Fork C-236
Fourche-Jessieville-Winona Ranger District		
Baker Upper Brushy Upper Lake Winona (Phase III) Upper North Fork	Wilson Chopoff Browns Creek	Hopper Danville Lower North Fork
Mena-Oden Ranger District		
Johnson Creek Robertson Creek Old Growth South Rick Mountain	Chula II Board Camp Irons Fork	Chula Old Growth Buck Knob Twomile
Oklahoma Ranger District		
C-1808	Cedar Creek	Brushy Creek
Poteau Ranger District		
Oliver Branch Round Mountain	Fourche Mountain Fourche River Access	Mill Creek Fork River

Table B.48 Pre-Existing Project Decisions for Non-Timber Related Projects (may have some Activities not Completed prior to the Effective Date of the Revised Forest Plan)

Caddo-Womble Ranger District		
O'Neal Land Exchange	Greenland Sales	Albert Pike
Fourche-Jessieville-Winona Ranger District		
Ouachita Girl Scout Camp	Acquired Lands TSI	
Mena-Oden Ranger District		
Shady Lake Acquired Lands TSI	Wolf Pen Gap	Mine Closures
Oklahoma Ranger District		
Broken Bow Office		
Poteau Ranger District		
Little Pines		

Appendix C – Aquatic Resources

Watersheds are numbered according to their relationship to one another. The first two digits in a watershed number refer to their region (1st level). The second two digits refer to their Subregion (2nd level), and so on. For example, a regional watershed (1st level) is divided into smaller regions and units according to drainage areas. As is shown in Table C.1 below, regions are divided into subregions, which are divided into accounting units that are divided into 5th level watersheds.

Table C. 1 5TH Level Hydrologic Units on the Ouachita National Forest

.00 Region (1 st level)		
0000 Sub-Region (2 nd level)		
000000 Accounting unit (3 rd level)		
00000000 Cataloging unit (4 th level)		
0000000000 Watershed (5 th level)	Watershed Acres	Percent of Watershed Under NFS Management
08 Lower Mississippi Region		
0804 Lower Red – Ouachita		
080401 Upper Ouachita		
08040101 Ouachita Headwaters		
804010101 Irons Fork	85,841	37.90
804010102 Kates Creek	142,469	44.79
804010103 Muddy Fiddler	150,518	72.54
804010104 South Fork of the Ouachita	102,466	66.43
804010105 North Fork	110,210	71.41
804010106 Blakely	113,307	48.49
804010107 Lake Hamilton	78,481	16.10
804010108 Mazarn	60,186	48.11
804010109 Little Mazarn	87,247	1.40
08 Lower Mississippi Region		
0804 Lower Red – Ouachita		
080401 Upper Ouachita		
08040102 Upper Ouachita		
804010205 Headwaters of the Caddo	67,378	64.12
804010206 Carney Creek	76,380	14.79
804010207 South Fork of the Caddo	49,154	48.97
08 Lower Mississippi Region		
0804 Lower Red – Ouachita		
080401 Upper Ouachita		
08040103 Little Missouri		
804010301 Headwaters of the Little Mo	83,368	54.98
804010302 Greeson	68,981	2.85
08 Lower Mississippi Region		
0804 Lower Red – Ouachita		
080402 Lower Ouachita		
08040203 Upper Saline		
804020301 Alum Fork	89,915	30.03
804020302 North Fork	61,712	23.07
804020303 Middle Fork	61,943	12.17

.00 Region (1 st level)		
0000 Sub-Region (2 nd level)		
000000 Accounting unit (3 rd level)		
00000000 Cataloging unit (4 th level)		
0000000000 Watershed (5 th level)		
	Watershed Acres	Percent of Watershed Under NFS Management
11 Arkansas-White-Red Region		
1111 Lower Arkansas		
111101 Robert S. Kerr Reservoir		
11110105 Poteau		
1111010501 Headwaters of the Poteau	109,588	36.24
1111010502 Black Fork	125,962	73.55
1111010503 Middle Poteau	93,307	41.22
1111010504 Fourche Maline	166,086	0.01
1111010505 Wister	140,837	33.44
1111010506 Riddle Creek	218,110	2.76
1111010508 James Fork	138,965	6.13
11 Arkansas-White-Red Region		
1111 -- Lower Arkansas		
111102 -- Lower Arkansas-Fourche La Fave		
11110204 Petit Jean		
1111020401 Washburn	169,291	17.85
1111020402 Sugar Creek	142,517	34.37
1111020403 Deadman Creek	84,080	25.09
1111020404 Chickalah Creek	86,463	3.86
1111020405 Dutch Creek	91,549	61.14
1111020406 Heath	56,685	4.64
1111020407 Lower Petit Jean	71,760	0.01
11 Arkansas-White-Red Region		
1111 -- Lower Arkansas		
111102 -- Lower Arkansas-Fourche La Fave		
11110206 Fourche La Fave		
1111020601 Cedar Creek	224,790	80.42
1111020602 Gafford Creek	114,940	63.49
1111020603 Nimrod	97,337	41.56
1111020604 Lower Fourche	126,395	10.91
1111020605 South Fork of the Fourche	149,552	54.26
11 Arkansas-White-Red Region		
1111 Lower Arkansas		
111102 Lower Arkansas-Fourche La Fave		
11110207 Lower Arkansas-Maumelle		
1111020702 Maumelle	89,324	20.15
11 Arkansas-White-Red Region		
1114 Red-Sulphur		
111401 -- Red-Little		
11140105 Kiamichi		
1114010501 Headwaters of the Kiamichi	157,396	49.83
11 Arkansas-White-Red Region		
1114 Red-Sulphur		
111401 -- Red-Little		
11140106 Pecan-Waterhole		
1114010604 Norwood	105,053	10.96

.00 Region (1 st level)		
0000 Sub-Region (2 nd level)		
000000 Accounting unit (3 rd level)		
00000000 Cataloging unit (4 th level)		
0000000000 Watershed (5 th level)	Watershed Acres	Percent of Watershed Under NFS Management
1114010605 McKinney Creek	55,568	3.73
11 Arkansas-White-Red Region		
1114 Red-Sulphur		
111401 -- Red-Little		
11140107 Upper Little		
1114010704 Glover	220,499	16.82
1114010705 Lower Little River	201,563	1.91
11 Arkansas-White-Red Region		
1114 Red-Sulphur		
111401 -- Red-Little		
11140108 Mountain Fork		
1114010801 Twomile	112,896	40.16
1114010804 Beech	195,562	15.31
1114010805 Broken Bow Lake	233,094	29.32
11 Arkansas-White-Red Region		
1114 Red-Sulphur		
111401 -- Red-Little		
11140109 Lower Little		
1114010901 Flat Creek	192,528	2.56
1114010902 Upper Rolling Fork	109,476	0.14
1114010903 Lower Rolling Fork	120,428	1.12
1114010904 Headwaters of the Cossatot	174,696	31.46
1114010907 Shady Lake	71,752	7.14

Figure C.1 shows the 5th level watersheds (subdivisions of 4th level cataloging units) that contain lands managed by the Ouachita National Forest. Fifty 5th level watersheds are potentially affected by management of the Forest.



Figure C.1 Fifth Level Watersheds within 4th Level Cataloging Units

Watersheds (5th level) for the headwaters of the Ouachita, Upper Ouachita, and Little Missouri 4th level cataloging units (designated by shading) are shown in Figure C.2. Named watersheds indicate that lands managed by the Forest are within that watershed.



Figure C.2 5th level watersheds within the Headwaters of the Ouachita, Upper Ouachita, and Little Missouri 4th Level Cataloging Units

Watersheds within the Petit Jean and Fourche La Fave cataloging units (designated by shading) are named in Figure C.3.

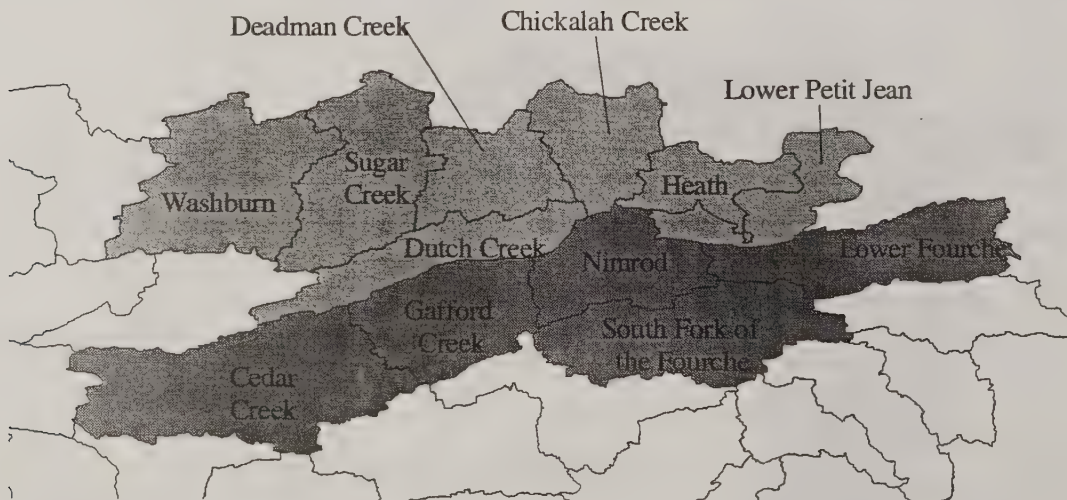


Figure C.3 Watersheds in the Petit Jean and Fourche La Fave 4th Level Cataloging Units

Within the 4th level cataloging units of Mountain Fork, Upper Little, Lower Little and Pecan/Waterhole (designated by shading), the following 5th level watersheds are found in Figure C.4.

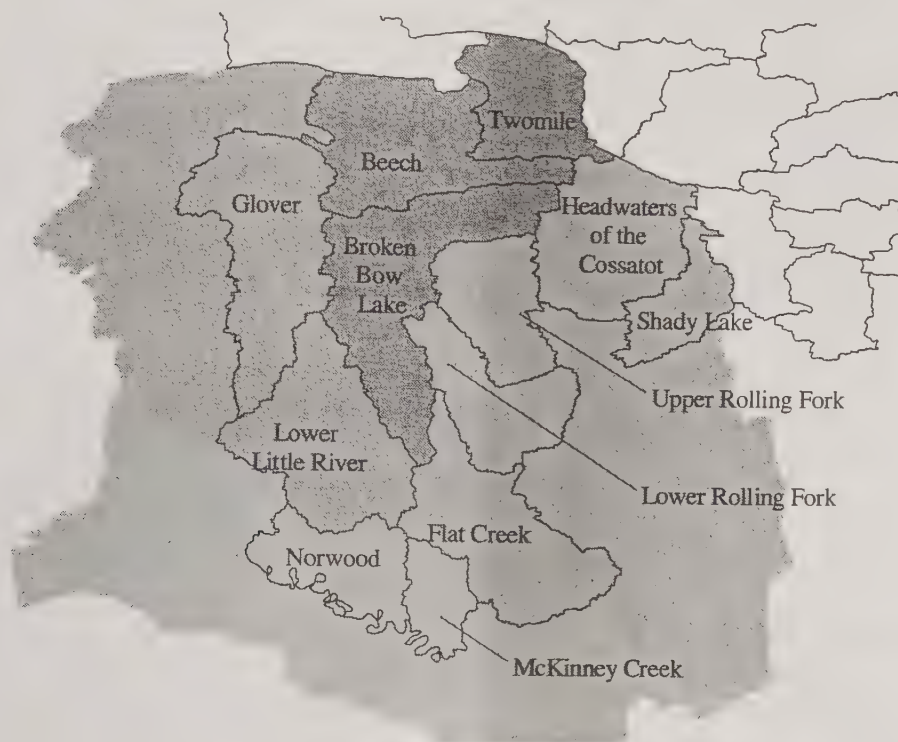


Figure C.4 Watersheds in the Mountain Fork, Upper Little, Lower Little and Pecan/Waterhole 4th Level Cataloging Units

Watersheds with lands managed by the Ouachita National forest in the Poteau and Kiamichi 4th level cataloging units (designated by shading) are found in Figure C.5.



Figure C.5 Watersheds Found in the Poteau and Kiamichi 4th Level Cataloging Units

Only four 5th level watersheds (Figure C.6) are found with lands managed by the Ouachita National Forest in the Lower Arkansas-Maumelle and Upper Saline 4th level cataloging units (designated by shading).



Figure C.6 Watersheds in the Lower Arkansas-Maumelle and Upper Saline 4th Level Cataloging Units

Transmission Facilities

Using the Tiger (US Census Bureau 2000) line data across the entire 5th level HUCs with National Forest ownership, over 582 miles of major powerlines, 10 miles of major waterlines, and 266 miles of pipeline (primarily oil and gas) are found. Within Forest ownership, 39 miles of major powerlines, 2 miles of waterlines, and 29 miles of pipeline (primarily oil and gas) occur within the lands managed by the Forest. Special use permits identify 136 miles of major powerlines, 147 miles of waterlines, and 36 miles of pipeline (primarily oil and gas) within the forest.

Using the 2000 Tiger line data across the entire 5th level HUCs with National Forest ownership over 436 miles of active railways and 55 miles of abandoned railways are found. Within lands managed by the Forest, only 7 miles of active railways are located on the forest. Figure C.7 shows the general location of major powerlines, pipelines, and railroads with respect to National Forest System lands.

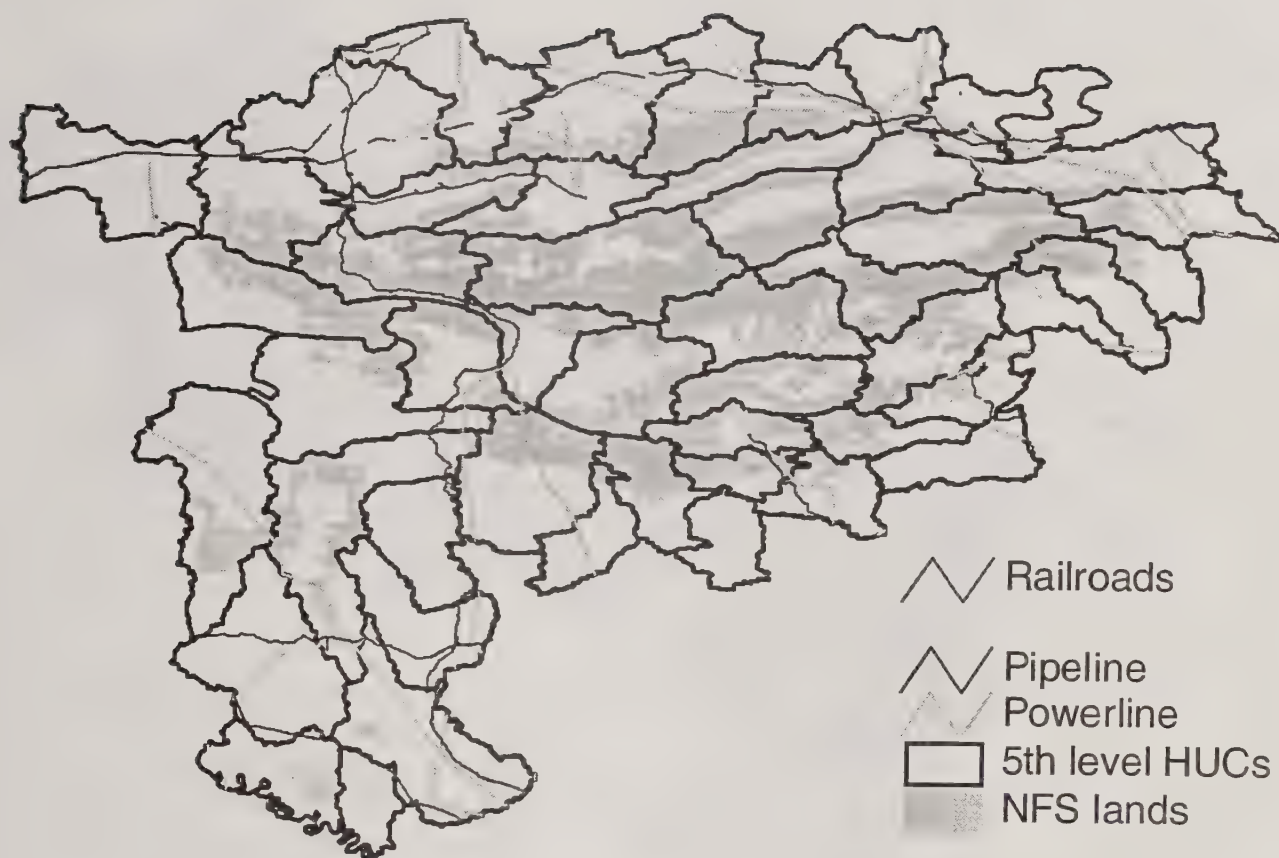


Figure C.7 General Location of Major Powerlines, Pipelines, and Railroads

Condition and Vulnerability

Watershed condition and vulnerability were determined through a forest-wide watershed assessment. (US Forest Service 2004). Fifteen factors (eight condition and seven vulnerability factors) affecting watershed condition or watershed vulnerability were addressed and ranked on 5th level watersheds across the Forest. Figure C.8 shows the watersheds with a better condition and lower vulnerability (by shading) and watersheds with a higher vulnerability and poorer condition. Lake Hamilton watershed has the lowest overall score, based on road crossings, point sources, population, road density and drinking water sources. Riddle Creek, Irons Fork Middle Fork, Headwaters of the Poteau, Lower Little River and Little Mazarn also have low overall watershed values.

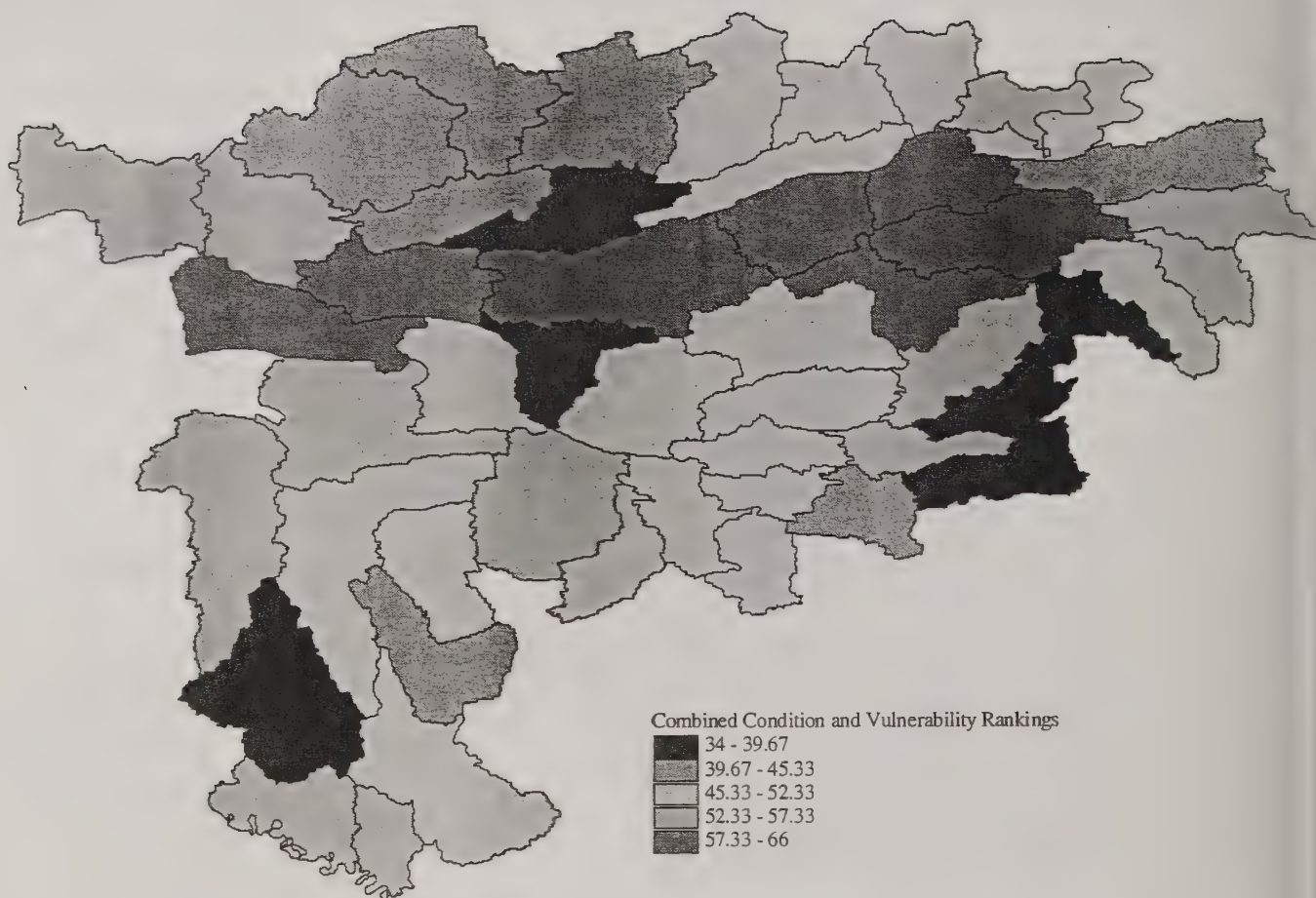


Figure C.8 Overall Watershed Value

Guidance Reviewed

The National Forest Management Act of 1976

Among other provisions addressing water and water quality, the National Forest Management Act includes the following:

“Sec. 5(5) Program recommendations which--(C) recognized the fundamental need to protect and where appropriate, improve the quality of soil, water and air resources.”

“Sec. 6(3) specifying guidelines for land management plans developed to achieve the goals of the program which--(E) insure that timber will be harvested from National Forest System lands only where--(i) soil, slope, or other watershed conditions will not be irreversibly damaged; (iii) protection is provided for streams, stream-banks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat;...”

The 1987 Amendments to the Clean Water Act

“Sec. 319. Nonpoint Source Management Programs:

a) State Assessment Reports—

(1) Contents

(A) identifies those navigable waters within the State which, without additional action to control nonpoint sources of pollution, cannot reasonably be expected to attain or maintain applicable water quality standards or the goals and requirements of this Act;”

(B) identifies those categories and subcategories of nonpoint sources or, where appropriate, particular nonpoint sources which add significant pollution to each portion of the navigable waters identified under subparagraph (A) in amounts which contribute to such portion not meeting such water quality standards or such goals and requirements;”

(C) describes the process, including intergovernmental coordination and public participation, for identifying best management practices and measures to control each category and subcategory of nonpoint sources and, where appropriate, particular nonpoint sources identified under paragraph (B) and to reduce , to the maximum extent practicable, the level of pollution resulting from such category, subcategory, or source...”

(b) State Management Programs—

(2) Specific Contents.

(A) An identification of the best management practices and measures which will be undertaken to reduce pollutant loadings resulting from each category, subcategory, or particular nonpoint source designated under paragraph (1)(B), taking into account the impact on the practice on ground water quality.”

(3) An identification of programs...to achieve implementation of the best management practices by the categories, subcategories, and particular nonpoint sources...”

Sec. 313

(a) Each department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal Government... (2) engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants, and each officer, agent, or employee thereof in the performance of his official duties, shall be subject to and comply with all Federal, State, interstate, and local requirements, administrative authority, and sanctions respecting the control and abatement of water pollution in the same manner, and to the same extent as any nongovernmental entity...”

EPA, August 19, 1987 Guidance: Nonpoint Source Controls and Water Quality Standards

“It is recognized that Best Management Practices (BMPs) are the primary mechanism to enable the achievement of water quality standards. The State water quality plan should include identification of the process by which nonpoint source controls including Best Management Practices (BMPs) are selected to achieve water quality standards. The process should include: (1) design of BMPs based on site-specific conditions, technical, economic and institutional feasibility; (2) monitoring to ensure that practices are correctly designed and applied; (3) monitoring to determine: a) the effectiveness of practices in meeting water quality standards, and b) the appropriateness of water quality criteria in reasonably assuring protection of beneficial uses; (4) adjustment of BMPs when it is found that water quality standards are not being protected to a desired level and/or possible adjustment of water quality standards based on considerations in 40 CFR 131.”

“EPA's water quality regulation (40 CFR 131) provides that State adopted water quality standards shall include designated beneficial uses and water quality criteria to protect those uses as well as include an antidegradation policy. It is intended that proper installation of State approved BMPs will achieve water quality standards. Therefore, water quality standards are to be used to measure the effectiveness of BMPs...”

“For proposed management actions, BMPs designed and implemented in accordance with State approved process will normally constitute compliance with the CWA. The CWA does not itself directly establish a mechanism for enforcing WQS

(water quality standards) directly against NPS (nonpoint sources). BMPs developed under a State approved process may be used as performance standards for proposed actions...”

“Once BMPs have been approved by the State, the BMPs become the primary mechanism for meeting water quality standards. Proper installation, operation and maintenance of State approved BMPs are presumed to meet a landowner's obligation for compliance with applicable water quality standards...”

In response to EPA's 1987 guidance, the Clean Water Act, and the National Forest Management Act, the Southern Region drafted a “strategy” in 1989 that restated many of the provisions in these documents:

“A management process should be identified by which NPS controls, including BMPs, can be selected and implemented so that beneficial uses can be maintained. The process should include: (1) design of site-specific BMPs based on technical, economic, and institutional feasibility, (2) monitoring to ensure that practices are correctly designed and applied, (3) monitoring to determine effectiveness of practices in meeting water quality objectives, and the appropriateness of water quality criteria for describing the needs of water dependent resources and, (4) a mechanism to adjust BMPs and/or standards as appropriate.

Programs based on design and implementation of BMPs must be the primary mechanism for attaining water quality standards. Proper installation, operation, and maintenance of BMPs as determined by a State approved process is presumed to meet a landowner's or operator's obligation for compliance with applicable water quality standards. If subsequent evaluation indicates that approved and properly installed BMPs are not achieving water quality standards, BMPs should be revised and/or water quality standards evaluated.

Through the iterative process of monitoring and adjustment of BMPs and/or water quality standards, it can be expected that BMPs will lead to achievement of water quality standards. BMPs as determined by a State approved NPS Management System are the performance standards that land managers are expected to meet. Water quality standards should not be used a regulatory performance standard, but coupled with monitoring, should be used as a measure of NPS system effectiveness.”

Appendix D – Biological Assessment



Biological Assessment for the Revised Land and Resource Management Plan (Ouachita National Forest)

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Introduction

The Revised Land and Resource Management Plan (Forest Plan) for the Ouachita National Forest (NF) provides broad, strategic direction for managing the land and its resources. It does not make project-level decisions, nor does it contain commitments to implement specific projects. Those decisions are made after more detailed analyses and further public comment. Site-specific project decisions must be consistent with the Forest Plan. In some cases, the plan may be amended to allow projects to be implemented that would otherwise be inconsistent with the plan. The Forest Plan was prepared according to the requirements of the National Forest Management Act (NFMA), the National Environmental Policy Act (NEPA), and other laws and regulations. The revised Forest Plan replaces the 1990 Amended Land and Resource Management Plan for the Ouachita NF.

The Forest Plan was developed to present the management alternative that, compared with other management alternatives, comes nearest to maximizing net public benefits, consistent with the resource integration management requirements of 36 Code of Federal Regulations (CFR) Sections 219.13 through 219.27. The accompanying Draft Environmental Impact Statement (DEIS) describes the analysis that was used in formulating the management alternatives and determining the preferred alternative for management of the Ouachita NF. Species on the Regional Forester's list of Sensitive species are covered under separate documentation in a Biological Evaluation.

Forest Roles and Contributions

At the global and national scales, the Ouachita National Forest:

- sustains the largest expanse of native shortleaf pine ecosystems under one ownership and also harbors outstanding oak-dominated and mixed mesic forest and woodland systems
- provides opportunities for scenic driving on National Forest Scenic Byways, Scenic Highways, and a wealth of scenic unpaved roads
- provides high-quality recreation settings for the 192 miles of the Ouachita National Recreation Trail that are within the boundaries of the Forest, the Winding Stair National Recreation Area, and two designated Wild and Scenic Rivers
- together with the Ozark NF, is part of a recreation draw zone (a 75-mile straight-line radius from the borders of the two national forests) in which more than 5 million people live
- includes six designated wildernesses covering approximately 65,000 acres
- is one of the few sources for electronic grade, high-quality quartz in North America and a major world producer, and the leading U.S. producer of quartz crystal, for aesthetic and jewelry uses

- is thought to have the largest **concentration** of prehistoric mines (novaculite mines) in North America
- is **home** to a wealth of native **biodiversity** (plants, animals, natural communities), including at least five salamander species, seven fish species, 13 crayfish species, and 15 plant species that are endemic to the Ouachita Mountains; the Forest also provides the only breeding and foraging habitat for the largest population of the Endangered Red-cockaded Woodpecker in the Ouachita Mountains and foraging and potential breeding habitat for the only other population
- conserves one archeological site and 90 buildings/structures on the National Register of Historic Places and over 1,400 sites eligible to be included on the National Register.

On regional and local scales, the Ouachita National Forest:

- contains diverse habitats important to maintaining populations of many native plant, fish, and animal species
- conserves an important, 16.5-mile segment of the Glover River, the last free-flowing river in Oklahoma, and almost two miles of the Mountain Fork River as designated Critical Habitat for the Threatened leopard darter
- is an important source of high-quality wood products, especially shortleaf pine sawtimber, for local and regional economies
- is one of the few large areas in Arkansas or Oklahoma where access for hunting is free and opportunities to hunt wild turkey, white-tailed deer, gray squirrel, and black bear are good to excellent
- provides high-quality recreation settings for hiking, mountain biking, and horseback riding on more than 600 miles of trail; motorized use on hundreds of miles of roads and about 100 miles of trails; and fishing in hundreds of miles of clear streams and dozens of lakes and ponds
- is the primary place of origin for much of the surface water that supplies communities in the Ouachita Mountains and is an important source of water for central Arkansas (via Lake Winona); lands of the Ouachita NF surround the source of potable water (Broken Bow Lake) for a large area in southeastern Oklahoma.

Plan and Analysis Area Location

The Ouachita NF is located in western Arkansas and southeastern Oklahoma and includes nearly 1.8 million acres of federally managed land, shown on the vicinity map (Figure 1). The Forest is located within Ashley, Garland, Hot Spring, Howard, Logan, Montgomery, Perry, Pike, Polk, Saline, Scott, Sebastian, and Yell Counties in Arkansas and LeFlore and McCurtain Counties in Oklahoma.



Figure 1. Ouachita National Forest Vicinity Map

Consultation History

Formal consultation requests by the Forest Service have been accepted in accordance with Section 7(a)(2) of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). Following is a brief summary of information relevant to the formal consultation process:

June 9, 1994 – US Fish and Wildlife Service (USFWS) letter of concurrence with the request of the Ouachita NF to modify the biological opinion (BO) of January 10, 1994, concerning impacts of ongoing forestry management practices on the Ouachita and Ozark-St. Francis NF's on the endangered American Burying Beetle (*Nicrophorus americanus*).

May 21, 1999 - USFWS in Vicksburg completed the biological opinion on the effects of the forest management on the Indiana bat (*Myotis sodalis*). The reasonable and prudent measures identified in the BO are incorporated in this proposed treatment.

July 9, 2002 – USFWS transmitted the biological opinion pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), on the USDA Forest Service's proposed removal of the existing forest road 53000 low-water crossing in McCurtain County, Oklahoma.

January 13, 2003 – Steve Osborne was hired as the USFWS employee to work as liaison with the FS on plan revision issues that deal with endangered species and ecosystems that affect endangered species. Since that time, there has been an almost continuous dialogue between FS employees involved in plan revision and USFWS employees responsible for species and systems that could be affected by

plan revision. Other USFWS employees that were involved with consultation include Allan Mueller, Chris Davidson, David Campwerth, Jim Besley, Lindsey Lewis, Lisa Irwin, Marge Harney, Melvin Tobin, and Mitch Wine from the USFWS office in Conway, Arkansas, and Chris O'Meilia, Hayley Dikeman, Richard Stark and Steve Hensley from the USFWS office in Tulsa, Oklahoma. Coordination with the USFWS liaison has included numerous meetings, phone calls, and e-mails pertaining to threatened and/or endangered species and their viability on the forest.

Additional information concerning threatened and/or endangered species was gained at two agency partner meetings on plan revision. These meetings resulted in collaborative comment letters to the Ozark-St. Francis and Ouachita National Forests from the agencies involved. Partner Meeting dates were April 29, 2004 and May 2, 2005. Attendance included the Arkansas and Oklahoma Field Offices of the Fish and Wildlife Service along with land management professionals with threatened and/or endangered species experience from The Nature Conservancy, Arkansas Game and Fish Commission, Oklahoma Department of Wildlife Conservation, and Arkansas Natural Heritage Commission.

Proposed Management Actions

The Forest Service proposes to revise the Land and Resource Management Plan (Forest Plan) for the Ouachita NF. The purpose of the Forest Plan is to provide long-term, strategic direction for natural resource management on the Forest. Projects designed to implement the direction of the Forest Plan are undertaken only after additional, project-specific environmental consideration and public involvement.

The Forest Service published the current Forest Plan for the Ouachita National Forest in 1990 (replacing the 1986 Forest Plan). The National Forest Management Act (NFMA) calls for such plans to be revised every 10 to 15 years. The current Forest Plan was 15 years old in March 2005 and is in need of revision to comply with NFMA. The need to revise this Forest Plan is also driven by the changing conditions and expectations identified in the Ozark-Ouachita Highlands Assessment, the Southern Forest Resource Assessment, and ongoing monitoring and evaluation results specific to the Ouachita NF.

In comparison to the current Forest Plan (Alternative A), the preferred alternative would place increased emphasis on active management for ecological conditions to sustain diversity and ecosystem health in each of the ecological system types identified in the EIS.

Ecosystem Health and Sustainability: In MAs 16-Lands surrounding Lake Ouachita and Broken Bow Lake, 17-Semi-Primitive Areas, and 19-Winding Stair Mountain National Recreation Area (and Associated Non-Wilderness Designations), responsiveness to ecosystem health would be accomplished through activities primarily driven by management for recreation (e.g., visual quality). Treatments of the Pine-Oak Forest, Pine-Oak Woodland, Shortleaf Pine/Bluestem Grass Woodland, West Gulf Coastal Plain Pine-Hardwood Forest, and Ouachita Dry to Mesic Oak Forest would allow a greater intensity of activities within Pine-Oak, as well as hardwood-dominated communities for ecosystem health. Projected prescribed burning would increase from 125,000 average annual acres (current) to approximately 180,000 average annual acres.

Land Allocation: Additions to three existing wilderness area would be recommended: a 620-acre block of National Forest land would be recommended as an addition to Flatside Wilderness in Arkansas; 77 acres would be recommended as an addition to Poteau Mountain Wilderness (East Unit); and 1,096 acres would be recommended as an addition to Upper Kiamichi Wilderness in Oklahoma. Streamside Management Areas would be maintained, but limited cutting to meet ecosystem health objectives would be allowed. Areas considered suitable for timber production would be approximately 1,009,887 acres, which is close to the current Forest Plan.

Public Access and Recreation: Open road density objectives would be modified to reflect a more realistic approach to areas that have a high density of non-National Forest System roads. Other access would be as in current Forest Plan, except that off-road motorized access would be on designated routes, not cross-country. The Scenery Management System would be implemented, with greater emphasis than the current Forest Plan on actively managing high traffic corridors and lakes for enhanced scenery. Management for scenic integrity may affect prescribed fire locations. Other vegetation management would be visually mitigated. Vegetation management would particularly promote “watchable wildlife,” including important birding areas.

Relationship to Communities: Under the preferred alternative, there would be potential for greater timber production, reduced fuels in the wildland-urban interface, and more impacts from smoke than the current Forest Plan. The Forest would continue to seek to improve economic relationships with communities and to seek other opportunities for coordination, including addressing opportunities represented by the Healthy Forest Initiative.

Table 1. Management Areas: The revised Forest Plan allocates lands and waters to management areas (MAs), each of which is defined by particular desired conditions and management standards.

MA	Descriptive Title	Approximate Acres (K=1,000)
1	Wilderness	70K
2	Special Interest Areas	26K
3	Developed Recreation Areas	5K
4	Research Natural Areas and National Natural Landmarks	2K
5	Experimental Forests	6K
6	Rare Upland Communities	48K
7	Ouachita Seed Orchard	<1K
8	Special Uses/Administrative Sites	<1K
9	Water and Riparian Communities	278K
14	Ouachita Mountains, Habitat Diversity Emphasis	767K
15	West Gulf Coastal Plain, Habitat Diversity Emphasis	8K
16	Lakes (Lake Ouachita/Broken Bow Lake)	87K
17	Semi-Primitive Areas	130K
19	Winding Stair Mountain National Recreation Area (and Associated Non-Wilderness Designations)	80K

MA	Descriptive Title	Approximate Acres (K=1,000)
20	Wild and Scenic River Corridors	26K
21	Old Growth Restoration	70K
22	Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat	173K
Total Number of Acres		1,778K

Table 2. Proposed and Probable Activities (Including Timber Sale Program): The preferred alternative includes the following projected management activities.

Activity	Unit of Measure	Range of Proposed/ Probable Annual Activity
Allowable Sale Quantity	Million cubic feet/year	27
Timber offered for sale	Million cubic feet/year	20-30
Regeneration harvest (by modified seedtree/shelterwood methods)	Total Acres	5,000-6,000
Management Area 14- Ouachita Mountains, Habitat Diversity Emphasis	Acres	4,000-4,700
Management Area 15- West Gulf Coastal Plain, Habitat Diversity Emphasis	Acres	140
Management Area 17-Semi-Primitive Areas	Acres	250
Management Area 21-Old Growth Restoration	Acres	160
Management Area 22-Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat	Acres	1,000-1,200
Other MAs	Acres	250
Uneven-aged management	Total Acres	9,000-10,000
Management Area 14-Ouachita Mountains, Habitat Diversity Emphasis	Acres	7,200-7,850
Management Area 16-Lakes (Lake Ouachita/Broken Bow Lake)	Acres	1,000-1,300
Management Area 19-Winding Stair Mountain National Recreation Area (and Associated Non-Wilderness Designations)	Acres	800-850
Commercial Thinning	Total Acres	20,000-25,000
Management Area 14-Ouachita Mountains, Habitat Diversity Emphasis	Acres	10,000-13,700

Activity	Unit of Measure	Range of Proposed/ Probable Annual Activity
Management Area 15- West Gulf Coastal Plain, Habitat Diversity Emphasis	Acres	1,000
Management Area 17-Semi-Primitive Areas	Acres	400-500
Management Area 21-Old Growth Restoration	Acres	1,500-1,600
Management Area 22-Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat	Acres	7,000-8,200
Midstory reduction	Total Acres	4,325-5,000
Management Area 21-Old Growth Restoration	Acres	500-600
Management Area 22-Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat	Acres	3,500-3,725
Other MAs	Acres	325-500
Watershed improvement and maintenance	Acres	30-60
Arterial/collector roads reconstructed	Miles	15-20
Local roads constructed	Miles	5-10
Roads decommissioned	Miles	10-20
Trail maintenance (non-motorized)	Miles	300-350
Heritage resource survey	Acres	9,000-10,000
Active range allotments	Number	≤17
Prescribed burning	Acres	80,000-250,000
Management Area 6-Rare Upland Communities	Acres	5,000-10,000
Management Area 14-Ouachita Mountains, Habitat Diversity Emphasis	Acres	25,000-110,000
Management Area 17-Semi-Primitive Areas	Acres	8,000-22,000
Management Area 21-Old Growth Restoration	Acres	8,000-25,000
Management Area 22-Renewal of the Shortleaf Pine/Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat	Acres	27,000-70,000
Other MAs	Acres	7,000-13,000

Potential Project-Level Forest Management Activities: Forest management activities most commonly occurring and some of the potential activities that could occur at the project-level that are used in this Biological Assessment to determine effects to Threatened and Endangered species on or potentially occurring on the Ouachita NF are

listed in the following table. Each Threatened or Endangered species known to occur on the Ouachita NF will be evaluated as to the effects of these activities.

Table 3. Project-Level Forest Management Activities within Categories

Prescribed Fire
(Community Health, Fuel Reduction, Site Prep)
Timber Harvest & Regeneration Activities
Modified Seedtree or Shelterwood
Single Tree Selection
Group Selection
Lt/Med/Heavy Thinning
Mid-Story/Over-Story Thinning/Wildlife Stand Improvement
Clearcut (restore native species or rehabilitation)
Forest Regeneration Site Preparation (Singular or in combinations of)
Chainsaw
Rip
Chop
Shear
Herbicide
(Site Preparation, Invasive species)
Construction/Reconstruction/Maintenance
Roads (Temporary & Permanent)
Firelines
Trails (OHV, Equestrian, Biking, Hiking, Multi-Use)
Wildlife Openings
Wildlife Ponds
Other Ground Disturbing Activities
Skidding during timber harvest
Mining operations (Gravel or Mineral)
Decommissioning and Rehabilitating
Roads
Trails
Recreation Areas

Forest-wide Resource Management Conservation Measures: The Forest Plan presents standards for planning and implementing projects. This set of standards—the rules against which practices are measured—and other guidance provide the technical and scientific specifications that must be met to complete acceptable projects; to ensure compliance with applicable laws, regulations, Executive Orders, and policies; to resolve management issues and concerns; and to direct management practices toward achievement of desired conditions.

The forest-wide standards listed here either directly or indirectly provide conservation and/or protection for natural resources and ecosystem health forest-wide. The following list does not include all the standards in the Forest Plan, but does contain those most pertinent to protection, conservation or enhancement of the federally listed species'

habitat conditions considered here. Those standards that are particular to a certain listed species are shown in the separate section concerning that species.

Soil and Water Resources

- SW001 Allow heavy equipment operations on hydric soils, soils with a **severe** compaction hazard rating, and floodplains with frequent or occasional flooding hazard only during the months of July through November. Operations during December through June are allowed with the use of methods or equipment that do not cause excessive soil compaction. This standard does not apply to areas dedicated to intensive use, including but not restricted to administrative sites, roads, primary skid trails, log decks, campgrounds, and special use areas.
- SW002 Allow heavy equipment operations on soils that have a **high** compaction hazard rating only during the months of April through November. Operations December through March are allowed with the use of methods or equipment that do not cause excessive soil compaction. This standard does not apply to areas dedicated to intensive use, including but not restricted to administrative sites, roads, primary skid trails, log decks, campgrounds, and special use areas.
- SW003 Soils will be managed to maintain a minimum of 85 percent of an activity area in a condition of acceptable soil productivity following land management activities. This standard does not apply to lands dedicated to other uses such as administrative sites, roads, recreation trails, campgrounds and special use areas. If more than 15 percent of a project area exceeds one or more of the five following thresholds, then future management must have no additional detrimental effect unless natural recovery or mitigation measures have taken place:
- (1) bulk density will not increase more than 15 percent over the undisturbed level in the upper eight inches of soil
 - (2) soil organic matter will remain at least 85 percent of the natural or undisturbed total in the upper six inches of the soil
 - (3) soil loss from management actions will not exceed the estimated Forested T-factor for each soil or soil map unit, based on the cumulative time period between soil disturbing management actions
 - (4) soil puddling (tire track rutting) will not exceed six inches deep
 - (5) soil displacement will not exceed two inches or one-half the humus-enriched "A" horizon, whichever is less, over a surface area greater than 100 square feet that is more than ten feet wide.
- SW004 Erosion control measures will be applied within 30 days of completion of soil disturbing activities and within 15 days or less if such activities are conducted within SMAs adjacent to river reaches designated as Critical Habitat for leopard darter. Temporary erosion measures will be applied prior to completion of activities during December through February and during other times if operations are suspended for periods exceeding 30 days or when expected weather conditions indicate the need to control sediment.
- SW005 Areas of exposed soil must be stabilized. Where natural stabilization (such as needle and leaf fall, or natural vegetative establishment) is not expected to

stabilize the area within 30 days of completion of soil disturbing activities, use either native and/or non-invasive, non-native vegetation as a temporary protective cover until native vegetation occupies the site.

- SW006 Maintain rehabilitated areas until stabilized with a minimum effective ground cover of 60 percent on slope gradients up to 15 percent, 70 percent on slopes having 15 to 35 percent gradients, and 80 percent on slopes greater than 35 percent gradient.
- SW007 During temporary disturbance activities in which the soil is altered and displaced (through excavation averaging 2 feet deep or greater) over an area of one-tenth acre or more, the topsoil will be stockpiled for later use as a top dressing during reclamation or similarly redistributed through project design. The surface 6 inches of soil will be stockpiled. This standard applies to projects such as oil and gas exploration, surface mining, and pond construction.
- SW008 For erosion control, plan, install, and maintain drainage structures in roads, skid trails, and firelines using spacing guidelines from state Best Management Practices (where appropriate) and/or Forest Service directives. For waterbar (surface drain) spacing guidelines use Table 3.1. (Also see standards under Transportation and Timber Harvest Administration.)

[Forest Plan] Table 3.1 Guidelines for Waterbar Spacing

Grade (percent)	Maximum Distance Between Surface Drains or Natural Drainage Breaks (feet)¹
0 – 2	296
2 – 4	192
4 – 6	154
6 – 8	134
8 – 10	120
10 – 12	109
12 – 14	97
14 – 20	90
20 – 25	66

¹Site specific stabilization/cross drainage measures prescribed by a watershed specialist on these or steeper slopes may supercede these distance criteria.

- SW009 Protect public water source areas when pesticide applications or soil disturbing activities are proposed within designated public water source areas as shown in Appendix (Plan). The source water manager/operator will be notified during the scoping process.

Mine and Cave Habitat

- TE002 Proposed mining operations affecting abandoned mine adits and shafts or natural dens and caves that could be considered suitable habitat for federally Threatened and Endangered species or Southern Region Sensitive species must include conservation measures to protect the species and habitat.

Aquatic Proposed, Endangered, Threatened, Sensitive (PETS) Species

- TE003 As part of project planning within sixth level watersheds where aquatic Proposed, Endangered, Threatened, Sensitive (PETS) species occur or are anticipated to occur downstream from proposed ground-disturbing management activities, consider whether additional measures (e.g., wider Streamside Management Areas) are warranted to conserve habitat for these species.

Wildlife Habitat

- WF003 Provide for and designate areas for mast production at the approximate rate of 20 percent of each project area. Hardwood and hardwood-pine forest types, age 50 and older, comprise this component.
- WF004 Retain clumps of deciduous trees at a rate of one-half acre clump per 20 acres of regeneration cutting by even-aged methods in order to create den trees. Where possible, locate clumps around existing den trees. In addition, existing den trees will not be felled unless necessary for insect or disease control or for safety.
- WF005 Where timber is harvested, retain or create at least two snags per acre, minimum 12-inch diameter at breast height (dbh) with an objective of 16-inch dbh or larger. Where naturally occurring snags of this size are unavailable or cannot be created, retain or create snags near the required size. Standing snags will not be felled, unless necessary for insect or disease control or to provide for safety.
- WF006 Retain or develop mature growth pine habitats (80 years old or greater) and mature growth hardwood habitats (100 years old or greater) at a rate of five percent of each broad cover type within each project analysis area.

Forest Regeneration

- FR002 In pine management types, maintain a minimum of 10 percent hardwood in each stand where possible, and strive to achieve 20 percent, with a maximum not to exceed 30 percent. Within this hardwood component and, where available, retain large overstory hardwoods distributed throughout the stand at a minimum rate of five square feet BA/Acre. Maintain this composition through the life of the stand. Base hardwood component on composition existing prior to regeneration.
- FR003 In mixed pine-hardwood forests subject to timber harvesting, maintain between 30 and 50 percent hardwood in each stand, including large overstory hardwoods distributed throughout the stand.

- FR004 Keep a minimum distance of one-eighth mile between regeneration areas that are still considered openings. An even-aged regeneration area will no longer be considered an opening when the re-established stand has reached approximately 20 percent of the height of the tallest adjacent stand. Normally, this would occur at 10 years of age.

Timber Harvest Administration

- TH001 Normal operating season is nine months (March 1–November 30), except for the Tiak Ranger District, where the operating season is six months (June 1–November 30).
- TH006 Do not use unscoured drainageways upstream of defined channels for temporary roadways, landings, or skid trails. Crossings are allowed.
- TH007 Culverts, bridges or reinforced crossings may be required on temporary roads at all points where it is necessary to cross protected stream courses. Ford crossings may be permitted with written authorization in locations containing exposed bedrock or rock-fragment bottoms, or where streams can be protected with clean rock aggregate or other suitable treatment measures. In no case will temporary culverts involving the placement of fill material in stream courses be allowed on streams identified as important for fisheries unless the forest fisheries biologist determines washed rock fill may be safely used.
- TH009 Upon termination of management activity, obliterate and revegetate temporary roads. Effectively block them to normal vehicular traffic within 50 feet of the beginning of the road and include dips and/or waterbars for erosion control. See Table 3.1 for recommended spacing of waterbars. Remove all temporary crossings. Restore the natural contours and slope on temporary road segments that have grades of 14 percent or greater.

Herbicide Use

- HU003 To minimize potential effects of herbicide use, whenever possible, use individual stem treatments, directed spraying, and crop tree release rather than broadcast or grid applications. Do not use broadcast or grid applications within Streamside Management Areas (see MA 9 for other restrictions.)
- HU004 Herbicides and application methods are chosen to minimize risk to human and wildlife health and the environment. Herbicides that are not soil-active will be used in preference to soil-active ones when the vegetation management objectives can be met.
- HU007 Soil-active herbicides will not be used within a 50 foot buffer of the dripline of trees that are located within the Streamside Management Area (SMA) except for treatments designed to control invasive and/or exotic species within the SMA.
- HU008 With the exception of treatments designed to release designated vegetation selectively resistant to the herbicide proposed for use or to prepare sites for planting with such vegetation, no soil-active herbicide will be applied within 30 feet of the drip line of non-target vegetation specifically designated for retention

(e.g., den trees, hardwood inclusions, adjacent untreated stands) within or next to the treated areas. Chemical side pruning of trees is allowed, but movement of herbicide to the root systems of non-target plants must be avoided.

- HU009 Prohibit use of herbicides in the immediate vicinity of Endangered, Threatened, or Proposed plants. In areas occupied by sensitive plant species, use herbicides only where site-specific environmental analysis and biological evaluation conclude that the potential benefits of herbicide use significantly outweigh the potential negative effects. To protect Ozark chinquapin from direct herbicide application, stems will be individually flagged or otherwise marked in the field by qualified personnel.
- HU010 For treatments outside of SMAs, the following buffers will be used unless a site-specific analysis supports use within the designated buffer:
- 30 foot buffer from undefined drainages.
 - 200 foot buffer from any public or domestic water source.

Transportation

- TR001 Construct roads to minimum standards required to meet resource management needs and to protect environmental resources. Ensure good road drainage with a combination of properly constructed and well spaced wing ditches, broad-based dips, rolling dips, culverts, and/or bridges. Road diversion ditches (lead off ditches and wing ditches) and gradients will be designed to minimize off-site erosion and sedimentation from runoff. Outlets will be located on undisturbed forest soil or otherwise treated to minimize erosion and sedimentation. Outlets must not connect directly with defined stream channels. Road diversion ditches should be constructed so water will be dispersed and not cut channels across the SMA. Provide out-fall protection if cross drains, relief culverts, wing ditches, and leadoff ditches discharge onto erodible soils or over erodible fill slopes. Use adequate sized culverts to carry the anticipated flow of water.
- TR003 All new stream crossings will be constructed so that aquatic organism passage is not impaired and so that the natural flow regime is not significantly altered. Reconstruction of all stream crossings will consider aquatic organism passage and incorporate structures to aid such passage, where practical.
- TR005 For wildlife purposes, the optimal total open road density is 1.0 mile per square mile or less for all MAs except MAs 1 and 4 (where the desired density is zero open roads per square mile) and MAs 16, 17, 19, and 21 (where the desired density is 0.75 miles of open road per square mile or less during critical periods for wildlife, i.e., March to August). Include all open roads (permanent, local arterial and collector roads, regardless of jurisdiction) and Off-Highway Vehicle (OHV) trails in initial calculations; for calculating road density, a seasonally (March to August) closed road will be treated as a closed road.
- In analysis areas or subwatersheds where the current open road density is 1.0 mile per square mile or less, do not exceed 1.0 mile per square mile (do not exceed 0.75 mile of open road per square mile in MAs 16, 17, 19, and 21 where that density of open roads currently exists).

- Where the current total open road density is greater than optimal, recalculate using only roads and OHV trails under Forest Service jurisdiction. Analysis areas or subwatersheds will be examined, using a roads analysis process, for opportunities to reduce the density of open roads and OHV trails under Forest Service jurisdiction.

- TR007 Avoid road locations in habitats of Proposed, Endangered, Threatened and Sensitive species, woodland seeps, glades and other identified specific natural plant communities. When road location outside of these areas is infeasible, mitigation is required.
- TR015 Locate fords where substrate conditions will support the designed use. Maintain stream pattern and channel geometry when modifying a crossing.
- TR016 If crossings and culverts are removed, stream banks and channels will be restored to a natural size and shape.
- TR017 Structures such as fences, trails, and roads will be designed and built so that they minimize movement barriers and hazards for wildlife.

Land Administration

LA003 Landownership adjustments:

- will not dispose of habitat for Threatened or Endangered species (or those Proposed for listing) within the boundaries of the national forest except with another agency with equivalent responsibility for Proposed, Threatened or Endangered species;
- will not dispose—or will result in net gains— of habitat for (or populations of) Southern Region Sensitive species and unique or rare natural communities on national forest lands; and
- will not dispose of significant historical or archeological sites within the boundaries of the national forest except with another federal or state agency or a tribal government with equivalent responsibility for heritage resources.

Special Uses

- SU001 Road locations, utility corridors, or oil and gas pipelines in habitats of Proposed, Endangered, Threatened, or Sensitive species and/or identified, specific (rare) natural plant communities such as woodland seeps and glades will be avoided. When avoidance or complete protection is infeasible, losses will be mitigated.
- SU002 A special forest product permit (not a special use permit) is required for scientific collection of plants, and the permit must be approved by the Forest Supervisor.
- SU003 Permits for personal use of small amounts of special forest products, including medicinal plants, moss, lichens, and grapevines, may be issued. A sustainability assessment must be completed before a permit or contract can be issued for special forest products in amounts beyond personal use.

- SU004 New communication towers will be self-supporting and will be designed to mitigate collision impacts to bats and migratory birds. When authorized towers are reconstructed or replaced, the replacement tower will be self-supporting and designed to mitigate collision impacts to bats and migratory birds.
- SU005 Height of towers will be less than 200 feet above natural ground level. When authorized towers are reconstructed or replaced, the replacement tower will be less than 200 feet above natural ground level. An exception to the height limitation may be granted by the Forest Supervisor, if allowing an increase in height would result in placement of fewer towers. The applicant must prove that the requested height is the minimum necessary to provide communication service. Co-location of communication devices on the same towers will be encouraged.

Management Area 9 (Water and Riparian Communities)

- 9.01 Table 3.09 provides minimum widths of protected areas adjacent to bodies of water and on each side of perennial streams and other streams with defined channels that are at least one foot wide and three inches deep. The minimum width adjacent to edges of perennial streams, woodland seeps/springs and the banks of lakes and ponds equal to or greater than one-half acre is 100 feet measured horizontally. The minimum width adjacent to other streams with defined channels and ponds less than one-half acre is 30 feet measured horizontally.

[Forest Plan] Table 3.09 Minimum Width of Streamside Management Areas, by Slope Class¹

Type of SMA	0-5%	5–15% slope	15–35% slope	35%+ slope
	<i>Horizontal distance from both sides of stream bank or from banks of spring/lake/pond is shown. Distances are shown in feet.</i>			
Perennial stream; woodland seep/spring; lakes and ponds equal to or greater than ½ acre	100	100	125 ²	150 ³
Other defined channel; ponds less than ½ acre	30	50	75 ⁴	100 ⁵

¹ Include only the area to the top of the slope when the slope adjacent to the stream is shorter than the width shown; however, always protect at least 100 feet on either side of perennial streams and 30 feet on either side and above other streams with defined channels.

² Approximate slope distance is 129 feet.

³ Approximate slope distance is 159 feet.

⁴ Approximate slope distance is 77 feet.

⁵ Approximate slope distance is 106 feet.

[Forest Plan] Table 3.10 Activities within Streamside Management Areas

Permitted		Not Permitted Throughout the SMA
≤100 feet from perennial streams, woodland seeps/springs and bodies of water equal to or greater than one-half acre ≤30 feet from other streams with defined channels and ponds less than one-half acre in size	>100 feet from perennial streams, woodland seeps/springs and bodies of water greater than one-half acre > 30 feet from other streams with defined channels and ponds less than one-half acre in size	
Fell trees or create snags for enhancement of riparian or Threatened/Endangered/Sensitive species habitat.	Wildlife Stand Improvement; selection cuts or thinning to accomplish wildlife objectives.	Wheeled or crawler vehicles outside designated crossings (with exceptions ¹).
Tree cutting to reduce vulnerability to insect/disease pests and to restore native vegetation (e.g., in loblolly pine plantations). Felling and cable skidding of timber with minimal soil disturbance.	Thinning to restore native vegetation. Felling and cable skidding of timber with minimal soil disturbance.	Log loading areas.
Control of Southern Pine Beetle infestations – tree felling	Control of Southern Pine Beetle infestations – felling and removal	Livestock distribution and convenience

Permitted		Not Permitted Throughout the SMA
≤100 feet from perennial streams, woodland seeps/springs and bodies of water equal to or greater than one-half acre. ≤30 feet from other streams with defined channels and ponds less than one-half acre in size	>100 feet from perennial streams, woodland seeps/springs and bodies of water greater than one-half acre > 30 feet from other streams with defined channels and ponds less than one-half acre in size	
permitted; removal permitted with cable skidding (minimize soil disturbance) only if necessary for control.	permitted with cable skidding and minimal soil disturbance.	
Cutting individual trees for safety or to enhance visual quality within administrative sites, developed recreation areas and recreational lakes.	Cutting individual trees for safety or to enhance visual quality within administrative sites, developed recreation areas and recreational lakes.	
Use of aquatic approved pesticides for treatment of invasive non-native and nuisance species. ²	Use of aquatic approved pesticides ² for treatment of invasive non-native and nuisance species.	
Non-motorized trails, boat and fishing docks, launching ramps/areas and swimming beaches.	Non-motorized trails, boat and fishing docks, launching ramps/areas and swimming beaches.	
CUS, wildlife and rough reduction prescribed burns.	CUS, wildlife and rough reduction prescribed burns.	
Road reconstruction and maintenance. ⁴	Road construction, reconstruction, and maintenance. ⁴	
Temporary roads and skid trails at designated crossings.	Temporary roads and skid trails at designated crossings.	structures (salting and dusting facilities, corrals, etc.) and feeding areas. Mechanical site preparation or ripping. Recreation construction (with exceptions; see permitted activities). Site preparation burning. ³

¹Exceptions are wildfire suppression, stream habitat enhancement, road reconstruction, and prescribed burning (for control line construction criteria, see Standard 9.23).

²Limited use of terrestrial vegetation control herbicides is also permitted; see Standard 9.13.

³Except in cases where backing fires can be used so that not all surface litter is burned or vegetation killed.

⁴Road construction and reconstruction is permitted when there is no alternative route that is less environmentally damaging or where other routes would involve prohibitive cost or would clearly not be in the best public interest. Roads and crossings are to be located and designed to avoid unacceptable environmental impacts and maintain or restore aquatic organism passage.

Fisheries

- 9.03 Ponds less than one-half acre in size will not be stocked with fish to provide predator-free breeding habitat for amphibians, except at developed recreation and designated areas.
- 9.04 Lakes and ponds equal to or greater than one-half acre may be fertilized on a case-by-case basis when it has been determined that the overflow from the waterbody will not negatively impact stream fisheries, Lake Ouachita, or Broken Bow Lake and that state water quality criteria are not exceeded.
- 9.05 Stocking of any non-native aquatic species requires Forest Supervisor approval and appropriate state agency approval/permits. Non-native species stocking guidelines of appropriate professional societies will be consulted.
- 9.06 Stocking of rainbow trout in the Little Missouri River system will be evaluated on an annual basis. No more than 15,000 trout per year will be stocked in this planning period.
- 9.07 With the exception of situations covered by 9.05 and 9.06, streams will be managed for native fish populations.

Livestock Grazing

- 9.08 Restrict grazing in the Streamside Management Area where resource damage is occurring.
- 9.09 Develop range watering sources outside of the riparian area.
- 9.10 Permit grazing of areas where a usable forage resource exists and negative impacts on water quality are within allowable limits.

Water Resources

- 9.11 Avoid adverse impacts (long-term and short-term) associated with the occupancy and modification of floodplains. Destruction, loss, or degradation of wetlands will be avoided to the extent practicable, minimized or appropriately mitigated. (EO 11990 and EO 11998)
- 9.12 Water will not be diverted from streams or lakes and perennial streams will not be impounded on National Forest System lands when an instream flow needs or water level assessment indicates the diversion or impoundment would adversely affect stream processes, aquatic and riparian habitats and communities, and/or recreation and aesthetic values.

Pesticide Use (see also Forest-wide Herbicide Use Standards)

- 9.13 Pesticide use within MA 9 will be approved on a case-by-case basis by the Forest Supervisor, following site-specific analysis and a monitoring plan. Terrestrial vegetation control using herbicides within MA 9 may only be conducted on dams or for control of invasive and/or exotic species and will only be with an appropriately labeled formulation for both aquatic and terrestrial site use. Aquatic application of herbicide for control of invasive or nuisance aquatic vegetation/algae may occur, providing biological controls have failed, are not available, and/or other means of control are not suitable or practical.
- 9.14 Rotenone and other aquatic approved pesticides may be used for fish sampling or monitoring.

Minerals and Geology

- 9.15 Quartz crystal mining operations must be designed and implemented so that no mining or mining-related activity takes place within water and riparian areas.
- 9.16 Surface impacting, mining-related activities, and operations proposed in MA 9 other than quartz crystal mining (see Standard 9.14) must be designed and implemented so that no activity is conducted within 200 feet of streams and lakes; activities are appropriately mitigated through all stages of the operation; and, where source-water supplies may be affected, are approved only in cases where the appropriate municipal water management agency or organization concurs with the proposed mining operation, including any additional needed mitigation measures. The Forest Supervisor has final approval authority for all minerals operations in MA 9.
- 9.17 Removal of gravel and/or building/landscaping stone is not allowed within MA 9.
- 9.18 The design and operation of oil and gas drilling operations will include stipulations that activities not take place within 200 feet of MA 9 streams and lakes and that appropriate mitigation measures are applied through all stages of activity. All drilling fluids and muds must be disposed of in state-approved sites off National Forest lands.

Timber Harvest Administration

- 9.19 Prevent debris from entering streams during timber harvesting. If any debris enters streams, it will be removed within 48 hours unless otherwise agreed upon by the Forest Service.
- 9.20 Culverts, bridges, or reinforced crossings may be required on temporary roads at all points where it is necessary to cross protected stream courses. Ford crossings may be permitted with written authorization in locations containing exposed bedrock or rock-fragment bottoms, or where streams can be protected with clean rock aggregate or other suitable treatment measures. In no case will temporary culverts involving the placement of fill material in stream courses be allowed on streams identified as important for fisheries unless the forest or state fisheries biologist determines washed rock fill may be used.

Transportation

- 9.21 Do not locate roads and trails within or immediately adjacent to SMAs unless alternative routes have been reviewed and rejected as more environmentally damaging or if such location would clearly not be in the best public interest.
- 9.22 Where road location in riparian areas is necessary, design roads and crossings to minimize impacts on streams and associated aquatic habitats in order to protect the natural and beneficial values of these areas. Stabilize roads and fills at road crossings and culverts by utilizing rip-rap, plantings, mats, etc. Create sediment traps by installing barriers, fences, etc. when required for soil stability or sediment control.
- 9.23 All new stream crossings will be constructed so that aquatic organism passage is not impaired and so that the natural flow regime is not significantly altered. Reconstruction of all stream crossings will consider aquatic organism passage and incorporate structures to aid such passage, where practical.

Prescribed Fire

- 9.24 Minimize firelines for prescribed burns within Streamside Management Areas. Where there is no practical alternative, construct firelines that cross streams at designated points according to the following design criteria:
- Cross streams and associated SMAs at right angles (or as close to right angles as possible)
 - Follow temporary road/skid trail standard for slope restrictions
 - Use hand tools and/or back blade firelines away from streams
 - Ensure bank integrity
 - Construct firelines at minimum effective widths; width should not exceed 10 feet
 - Place waterbars at the edge of the SMA and at appropriate intervals (use Table 3.1 guidelines or shorter intervals) along the fireline as it crosses the SMA
 - Do not create entrenched firelines (those with prominent berms or banks)
 - Rehabilitate any existing, entrenched firelines by pulling the berms back into the fireline to restore grade and eliminate water channeling effects

Recreation

- 9.25 Manage recreational activities to ensure shoreline stability and protection of water quality. Ensure 90 percent of shoreline is well-vegetated or otherwise stabilized.

Timber

- 9.26 Logging equipment will be kept out of perennial and other stream channels with defined channels except on approved, designated crossings. Crossings will be at right angles to the stream or riparian area.
- 9.27 For proposed vegetation management treatments within designated public water source areas as shown in Appendix xx, the source water manager/operator will be notified during the scoping process and prior to project implementation.

Species Considered and Evaluated, and Key Findings

Terrestrial and Aquatic Federally Endangered and Threatened Species and Critical Habitat Considered (Table 4): There are five federally Endangered and two federally Threatened terrestrial species listed as occurring or potentially occurring within the Forest. At present, there are no species known to occur on the Forest that are proposed for federal listing. The terrestrial species include four birds, one mammal, one insect, and one reptile. There are four federally Endangered and two federally Threatened aquatic species—four mussel, one aquatic plant, and one fish species—listed as occurring or potentially occurring within the Forest. There is also designated Critical Habitat (two river reaches) within the Forest for the federally Threatened leopard darter.

Table 4. Status and Determinations of Effects to Ouachita National Forest Federally Threatened (T) or Endangered (E) Species

Common Name (Scientific Name)	Status	Comments	Determination
Least tern (<i>Sterna antillarum</i>)	E	No known occurrences or potential habitat on Forest	No effect
Piping plover (<i>Charadrius melodus</i>)	E	No known occurrences or potential habitat on Forest	No effect
Indiana bat (<i>Myotis sodalis</i>)	E	Only known as an occasional winter visitor to protected Bear Den Caves	Not likely to adversely affect (discountable)
Bald eagle (<i>Haliaeetus leucocephalus</i>)	T	Winter visitor and occasionally nests	Not likely to adversely affect (discountable)
American burying beetle (<i>Nicrophorus americanus</i>)	E	American Burying Beetle Area (ABBA) Historical ABB Counties of OK—McCurtain & LeFlore; and AR—Scott, Logan & Sebastian	Likely to adversely affect
		All other AR Counties with NF ownership outside of the ABBA	No effect
Red-cockaded Woodpecker (<i>Picoides borealis</i>)	E	Populations are limited to the restored Shortleaf Pine-Bluestem Ecosystem on the Ouachita NF (MA 22)	Not likely to adversely affect (discountable)
American alligator (<i>Alligator mississippiensis</i>)	TS*	No known resident or reproducing populations; occasional sightings in Red Slough & Broken Bow Lake	No effect

Common Name (Scientific Name)	Status	Comments	Determination
Winged mapleleaf mussel (<i>Quadrula fragosa</i>)	E	No known occurrences on Forest	No effect
Ouachita rock-pocketbook (<i>Arkansia wheeleri</i>)	E	Not found to occur within the Ouachita NF, but within close proximity	Not likely to adversely affect (discountable)
Scaleshell mussel (<i>Leptodea leptodon</i>)	E	Only one known occurrence on the Ouachita NF; poorly known, difficult to detect, extremely rare	Not likely to adversely affect (discountable)
Pink Mucket (<i>Lampsilis abrupta</i>)	E	No known occurrences on Forest	No effect
Arkansas fatmucket mussel (<i>Lampsilis powellii</i>)	T	Ouachita River drainage endemic; main populations are in the Forks of the Saline, S. Fork Ouachita and upper Ouachita rivers	Not likely to adversely affect (discountable)
Harperella (<i>Ptilimnium nodosum</i>)	E	Populations on the Ouachita limited to stream/river channels	Not likely to adversely affect (discountable)
Leopard darter (<i>Percina pantherina</i>)	T	Endemic to the Little River system in AR/OK; critical habitat designated on Ouachita NF	Not likely to adversely affect (discountable)
Leopard darter Critical Habitat	CH	Designated reaches of the Glover River and upper Mountain Fork	Not likely to adversely modify Critical Habitat (discountable)

*Threatened by similarity of appearance to other listed crocodilians.

Environmental Baseline and Potential Effects for the Terrestrial Species Evaluated in this Biological Assessment

Least tern (*Sterna antillarum*) and Piping plover (*Charadrius melodus*)

Environmental Baseline

Most least terns and piping plovers that occur on the Ouachita NF in Arkansas and Oklahoma are passing migrants. Some regularly forage within the Red Slough Wildlife Management Area. From May through September, a few nest in small colonies on exposed sandbars in the Arkansas, Mississippi, White, and Red Rivers outside of the Ouachita NF. Large river nesting habitat is threatened by manipulation of river flows. Reduced flows allow encroachment of woody vegetation, eliminating some bare sandbars. High flows during nesting wash away eggs and drown chicks. Nests are also lost to dredging operations, trampling by cattle, all-terrain vehicle use, storms and predation.

Determination of Direct, Indirect, and Cumulative Effects

The least tern and piping plover nest on sandbars of large rivers and may seasonally occur as migrants, but are not known to occur as reproducing populations on the Ouachita NF (James and Neal, 1986; Peterson, 1980). There is no known or potential large river sandbar habitat on the Ouachita NF; therefore, there should be no direct, indirect or cumulative effects from Ouachita NF management activities on these species. There are no known element occurrences on the Ouachita NF; therefore, a determination of "no effect" is made for the least tern and piping plover.

Indiana bat (*Myotis sodalis*)

Environmental Baseline

All current habitat use and distribution data for the Indiana bat, in combination with extensive District, Forest and regional surveys, a recent Anabat (acoustic detection) survey conducted during the maternity period, and surveys during the 2003 Ouachita Mountain Bat Blitz, have failed to locate this species in the Arkansas portion of the Ouachita NF or adjacent lands.

The Indiana bat's life history and habitat requirements, for both the active portion of the year and during hibernation, are well known and succinctly summarized by Menzel et al. (2001). Mist net surveys and examination of abandoned mines for bat species forest-wide and on nearby lands have been extensive (Heath et al. 1986; Steward et al. 1986; Saugey et al. 1989; Saugey et al. 1993; Nelson et al. 1991; Baker 2000; Reed 2004). None of these investigations resulted in the capture of a single Indiana bat.

Indiana bats were discovered hibernating in Bear Den Caves in eastern Oklahoma (Saugey et al. 1990). More recent investigations of the forest's bat fauna include a long-term study on the Winona portion of the district in Phase III research areas being conducted by a Southern Research Station work unit based at Stephen F. Austin University in Nacogdoches, Texas. Another study conducted during the summers of 2000/2001 by Henderson State University captured bats using ridge-top ponds and road ruts, specifically targeting detection of the Indiana bat. Neither of these studies resulted in the capture of Indiana bats (Perry and Thill 2001; Tumilson 2001).

The U.S. Forest Service, Arkansas Game and Fish Commission, and the Southeastern Bat Diversity Network sponsored a "Bat Blitz" on the Ouachita NF in Montgomery County, Arkansas on 4-7 Aug 2003. Volunteer biologists from state and federal agencies, universities, and private companies from nine states participated in this event to learn as much as possible about the bat fauna of the area while sharing techniques and experiences. No Indiana bats were captured during these four nights of intensive mist netting.

From 2002-2004, Reed (2004) surveyed extensively in the Lake Greeson Project Area, just south of the Arkansas portion of the Ouachita NF and just east of the Oklahoma portion. This study was specifically targeting the southeastern *Myotis*, but every bat species captured during bridge and mine surveys or mist netting efforts was identified and noted. The surveys actually overlapped the southern Ouachita NF in Arkansas, but did not extend into Oklahoma. There were seven bat species captured during this study, but no Indiana bats were captured.

Gardner (2001) published data from the Indiana bat Recovery Team and other sources in the scientific literature that show there are no records of this species reproducing in Arkansas or Oklahoma, and that Indiana bats typically travel north from winter hibernacula (located in the Ozarks and in southeastern Oklahoma), not south into the Ouachita Mountains.

Indiana bats occasionally hibernate in small numbers (no more than ten bats) in Bear Den Caves on the Ouachita NF in eastern Oklahoma, but have not been detected there or anywhere else on the Ouachita NF during the breeding season, despite numerous bat survey efforts. Bear Den Caves represent the only natural cave habitat occurring on the Ouachita NF, and they are within the congressionally designated Winding Stairs National Recreation Area. Very little active management activities occur near the caves other than gated protection of the cave habitat under a Forest Supervisor's Closure Order. The naturally limiting edaphic conditions of the potential foraging area surrounding Bear Den Caves maintain an open hardwood stand of old trees. This area is at high elevation where the soils are thin, the slope is steep, and soil moisture retention is low.

Determination of Direct, Indirect, and Cumulative Effects

The influence of Ouachita NF management activities on Indiana bat is summarized here. Refer to Table 3 from more information about each "Potential Forest Management Activity" category.

Potential Forest Management Activities (see Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Prescribed Fire		X			
Timber Harvest & Regeneration Activities	X				
Forest Regeneration Site Preparation	X				
Herbicide	X				
Construction, Reconstruction, Maintenance	X				
Other Ground-Disturbing Activities	X				
Decommissioning and Rehabilitating	X				

Direct effects to the Indiana bat could include disturbance and/or habitat degradation from human intrusions at Bear Den Caves, the only suitable hibernation site known to occur on the Ouachita NF. Because Bear Den Caves occurs in the Winding Stair Mountain National Recreation Area (MA19a), vegetation management activities are and will continue to be minimal; however, prescribed fire smoke may inadvertently enter the caves. Bear Den Caves are slated for continued protection by a Forest Supervisor's Closure Order from human disturbance; the effects on this hibernation site under all alternatives would be protection of the desired habitat. Management needed to maintain Indiana bat habitat at the cave opening and with the buffer area is not precluded.

Indirect effects in the general forest area could be enhancement or development of potential summer roost and foraging habitat. Although Indiana bats are not known to occur on the Ouachita NF during maternity periods, potential roost and foraging habitat could benefit from properly implemented prescribed burns, including improvement of foraging habitat conditions and creation of potential roosts. The flame lengths of prescribed burns are not likely to have a direct effect on potential roost trees. Indiana bats would normally be absent from the general forest area during all dormant season fires.

Management direction addresses the critical needs for habitat and protection of the Indiana bat and should improve or maintain foraging, roosting and hibernacula habitat conditions for this species at the landscape level. Additional site-specific analysis would be conducted on any projects planned for near Bear Den Caves.

Cumulative effects forest-wide, as well as at the Bear Den Caves site, would provide continued protection of the cave site. Forest-wide objectives and standards provide for retention, restoration and enhancement of hardwood and pine stands for potential summer foraging habitat.

A determination of "not likely to adversely affect" is made for the Indiana bat because:

- (1) There are no known occurrences of Indiana bats on the Ouachita NF during the summer (e.g. maternity sites).
- (2) The only known hibernaculum, Bear Den Caves, is gated to protect the caves from human intrusions.
- (3) Bear Den Caves occur in the Winding Stair Mountain National Recreation Area (MA 19a), where naturally limiting factors maintain an open hardwood stand that is optimal for bat flight, foraging and roosting habitat, and where few to no other FS management activities occur.
- (4) Proposed vegetation management activities, including hardwood retention, restoration and enhancement, and snag/den tree provision and retention, will continue to provide suitable potential summer foraging, and roosting habitat for bat species, including the Indiana bat, at the landscape level.
- (5) Proposed conservation measures will continue to provide for riparian area management and maintain or improve stability, function, and water quality of streams, ponds, and lakes. Stable or improved water quality would be beneficial in maintaining an aquatic prey base for bats.
- (6) Other potential subterranean bat habitat will continue to be protected by the following standard.

Mine and Cave Habitat

TE002 Proposed mining operations affecting abandoned mine adits and shafts or natural dens and caves that could be considered suitable habitat for federally Threatened and Endangered species or Southern Region Sensitive species must include conservation measures to protect the species and habitat.

(7) The FS will continue to consult on those projects that are proposed to occur within the management buffers for Bear Den Caves as per the following standards.

Indiana Bat Habitat (Bear Den Cave)

TE006 Maintain the cave gate to protect hibernating bats. The known hibernaculum and any other hibernacula that may be discovered will be protected by maintaining a buffer having a radius of 2 miles. Within this buffer, proposed ground-disturbing management projects and prescribed burning will be evaluated to determine their direct, indirect, and cumulative effects on Indiana bats and the hibernaculum.

TE007 When planning and conducting prescribed burns inside or near the Bear Den Cave buffer, avoid inundating the cave with smoke.

Bald Eagle (*Haliaeetus leucocephalus*)

Environmental Baseline

The bald eagle is a fairly common local migrant and winter resident around lakes and large rivers in Arkansas. Numbers have grown since the bald eagle was listed as Endangered, and the Federal listing has now been changed to Threatened. Eagles often perch on exposed limbs of tall trees near water (James and Neal 1986; USDI FWS 1983). They feed on fish, water birds, small mammals and carrion. The breeding territory for most of the local population is in the northern United States and Canada. Bald eagles are known to regularly use three bald eagle nests around Lake Ouachita on the Womble and Jessieville Ranger Districts (RD) and on the Poteau RD, where bald eagles have nested since 2000 near Lake Hinkle. Bald eagles utilize large trees near water as nest sites, as well as roosting sites in winter.

Determination of Direct, Indirect, and Cumulative Effects

The influence of Ouachita NF management activities on the Bald eagle is summarized here. Refer to Table 3 from more information about each "Potential Forest Management Activity" category.

Potential Forest Management Activities (See Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Prescribed Fire		X			
Timber Harvest & Regeneration Activities		X			
Forest Regeneration Site Preparation		X			

Potential Forest Management Activities (See Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Herbicide		X			
Construction, Reconstruction, Maintenance		X			
Other Ground-Disturbing Activities		X			
Decommissioning and Rehabilitating		X			

Direct effects to bald eagles, in the form of fatalities to individual birds from forest management activities, are not likely to occur through normal, management actions and activities occurring on the Ouachita NF due to their ability to move away from disruptive activities during the winter, and to USFWS/Forest Plan direction for nest protection measures.

Indirect effects to bald eagles and their habitat could occur. Negative indirect effects include disturbance that would result in breeding or nesting failure, and alteration of occupied habitats. Vegetation management activities including timber harvesting and/or road building activities have the potential to impact the bald eagle or its habitat, should it occur near streams, lakes, or other wetlands. Human disturbance from roads, trails, and campgrounds can also adversely affect the use of an area for nesting or roosting by eagles.

Beneficial indirect effects to habitat would result through the continued protective emphasis in Streamside Management Areas (SMAs). The primary threat to the bald eagle on the Ouachita NF is habitat degradation from loss of large trees near water. The SMAs of streams, rivers and lakes are unsuitable for timber production under the preferred alternative. Management activities within these SMAs are limited primarily to forest health and ecological restoration needs; therefore large trees near water are likely to benefit under all alternatives.

The revised Forest Plan uses recovery plan direction for establishing protection zones around bald eagle nests and communal roost sites. Management Area 9 (Water and Riparian Communities) emphasizes low levels of disturbance and maintenance of mature forest. Thus, the cumulative effects on bald eagle habitat would be beneficial maintenance or enhancement of the desired habitat.

The cumulative effects of management direction address critical needs for habitat and protection of roosts and nests from human disturbance. The proposed Forest Plan is not likely to adversely affect the bald eagle, and should provide for habitat conditions beneficial to this species.

A determination of "not likely to adversely affect" is made for the bald eagle because:

(1) Proposed vegetation management activities will continue to provide suitable perching, roosting, and nesting habitat for bald eagles.

(2) Watershed and riparian area management and Forest Plan standards will maintain or improve stability, function, and water quality of streams, ponds, and lakes. Stable or improved water quality would be beneficial in maintaining an aquatic forage base for eagles.

(3) Although recreation use is expected to increase slightly, Forest Plan direction and implementation and enforcement of habitat and nest protection guidelines will contribute to minimizing disturbance to bald eagles on the Ouachita NF.

Bald Eagle Habitat

TE004 Protection areas will be delineated and maintained around all bald eagle nests and communal roost sites. Restrictions on certain activities during critical periods for nesting will be as specified in the current guidelines for bald eagle habitat management from the US Fish and Wildlife Service, unless exempted or modified by that agency.

American burying beetle (*Nicrophorus americanus*)

Environmental Baseline

The American burying beetle (ABB) is a large, black-and-orange carrion beetle once found in 32 states and Canada but now known only in Arkansas, Oklahoma, Nebraska, and Rhode Island. Specimens have been documented in nine Arkansas counties, with the largest numbers in Fort Chaffee and on the Ouachita NF. Surveys have been conducted for the American burying beetle (ABB) across the Ouachita NF, but more intensively in Ranger Districts (RDs) and counties having known occurrences—the Poteau and Cold Springs RDs in Arkansas and the Tiak, Choctaw and Kiamichi RDs in Oklahoma. In Oklahoma, ABBs have been documented on the Ouachita NF in LeFlore and McCurtain Counties. American burying beetles are known to utilize the grass/forb/shrub seral stages of pine-oak or oak-pine dominated open and closed canopy forests, mesic hardwood forests, dry-mesic oak forests and dry oak woodland habitat on the Ouachita NF (USDI FWS 1994; Carlton and Rothwein 1998).

Reasons for the decline of this species are not well understood, but habitat fragmentation and pesticides are possible contributing factors. This insect feeds primarily on carrion from bodies of small vertebrates that it buries and later uses for food for hatching larvae. Like other carrion beetles, burying beetles play an important role in ecosystems, serving as scavengers responsible for recycling dead or decaying materials. Predators and scavengers such as American crow, raccoon, fox, opossum and skunk compete with ABB for carrion. Competition for carrion within the genus *Nicrophorus* and within the species *N. americanus* is documented. There are no known incidences of mammalian or bird predation on the beetles.

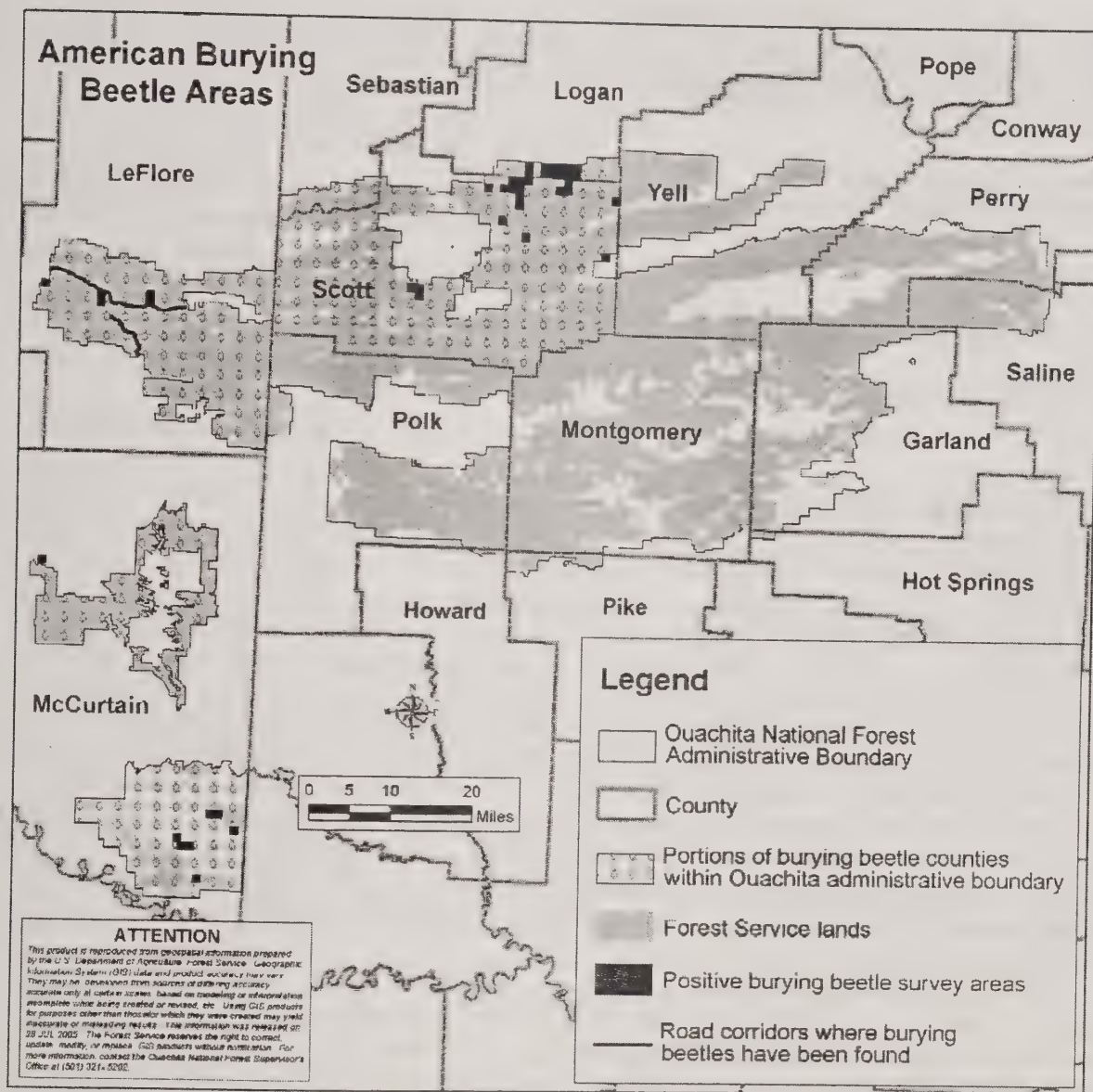
The ABB's rangewide decline has been attributed to a variety of factors, including decreasing populations of the small mammals and birds necessary for successful rearing of its larvae, and competition with vertebrate scavengers for small carrion. Contrary to the earlier belief that the ABBs were associated with eastern deciduous woodlands, it is now apparent that carrion availability (appropriate in size as well as

numbers) is more important than the type of vegetation or soil structure (Lomolino and Creighton 1995).

Determination of Direct, Indirect, and Cumulative Effects

Since 1992, the Ouachita NF has conducted numerous and comprehensive surveys on NF lands for the American burying beetle, in accordance with USFWS protocol. These surveys have confirmed continued existence of occurrence in the known historic counties of Arkansas (Scott, Logan, Sebastian), as well as Oklahoma (LeFlore and McCurtain). However, ABB have not been found to occur in any other counties within the Ouachita NF, even after well over 12,000 trap night surveys (Jerry Davis, personal communication, 28 July 05).

The counties of confirmed historical and existing ABB occurrence as previously listed, are designated as the American Burying Beetle Area (ABBA) and are evaluated separately from the rest of the Ouachita NF. Any given NF project will then either be within the ABBA or outside of the ABBA.



As there are no known occurrences of American burying beetles outside of the ABBA in those counties with NF lands, the proposal will have no effect in these areas. Periodic surveys will continue to be conducted on the NF lands outside of the ABBA, in accordance with US Fish and Wildlife Service monitoring protocols. If any American burying beetles are found to occur outside of the historic counties, then that county will be added to the American Burying Beetle Area, and management activities will be planned and implemented in accordance with the most current Forest Plan and USFWS direction.

The influence of Ouachita NF management activities on American burying beetle within the ABBA is summarized here. Refer to Table 3 from more information about each “Potential Forest Management Activity” category.

Potential Forest Management Activities (as listed in Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Prescribed Fire		X			
Timber Harvest & Regeneration Activities					X
Forest Regeneration Site Preparation					X
Herbicide Use	X				
Construction, Reconstruction, Maintenance					X
Other Ground-Disturbing Activities					X
Decommissioning and Rehabilitating					X

Direct effects include ground disturbing activities that may result in harm to ABB individuals, as buried carrion is the substrate of choice for depositing their eggs. Ground disturbing activities that could potentially harm ABB individuals include some forest regeneration site preparation activities, and construction, reconstruction, maintenance or decommissioning roads, firelines, trails and facilities. Direct effects to individual ABBs would be reduced or minimized due to adherence to the US Fish and Wildlife Service baiting-away protocol from project areas prior to implementation of “ground-disturbing” management activities.

Generally, the indirect effects of forest management activities will be beneficial to American burying beetle habitat in the preferred alternative. Increased establishment and maintenance of early seral habitat will provide enhanced habitat for the ABB prey base of small vertebrate carrion production. Indirect beneficial effects on ABB habitat would primarily involve maintenance and/or enhancement of the grass/forb/shrub vegetation condition that harbors small mammal and other potential carrion populations. The cumulative effects of forest management activities in the preferred alternative on ABB habitat would be continued enhancement of grass/forb habitat, providing conditions beneficial to this species, but ground-disturbing activities may harm individuals.

A determination of “likely to adversely affect” is made for the American burying beetle within the Ouachita NF American Burying Beetle Area because: ground disturbing activities may harm individuals and, even if Baiting Away and Trapping and Relocating are implemented, not all ABBs would be removed.

The FS will continue to coordinate with the USFWS on those projects that are proposed to occur within the American Burying Beetle Area, as well as conduct mitigation to minimize harmful effects as per the following standard.

American Burying Beetle Habitat

TE005 Potential project level impacts on individual American Burying Beetles (ABBs) will be reduced by using the U.S. Fish and Wildlife Service's (USFWS) current bait-away or trap-and-relocate protocols.

In the event that the Forest Service is unable to follow these protocols, the Forest will informally consult with the USFWS. Finally, the Forest Service will implement a monitoring plan for ABBs within the counties of known occurrence.

Red-cockaded Woodpecker (*Picoides borealis*)

Environmental Baseline

In the mid-1800s, John J. Audubon described the Red-cockaded Woodpecker (RCW) as abundant in Southern pine forests. Today, 10,000 to 14,000 individuals remain, living in a fragmented range in the southeastern United States. Unlike other woodpeckers, the RCW roosts in cavities in live pines requiring 80 to 120-year-old pines for its cavities, and extensive pine and pine-hardwood forests to meet its foraging needs. Much of the Southeast has been cleared for agriculture. Many remaining pine forests are unsuitable for the RCW. Because of the drastic loss and continued decline of habitat rangewide, the bird is federally classified as Endangered (NatureServe 2000). Basic biological and population data about RCWs have appeared in many technical publications.

Historically, RCWs occurred in pine forests of numerous species, ranging in the eastern United States from New Jersey south through Florida, and west from Missouri through Oklahoma and Texas. By the time RCWs were listed as Endangered, suitable habitat had shrunk to 1 percent or less of its historic levels, with predictable declines in the numbers of birds. Surveys in Arkansas in the 1970s and 1980s revealed a population of at most a few hundred birds confined to public lands and scattered holdings of timber companies (James and Neal 1986).

Management Area 22 includes areas restored or being restored to shortleaf pine-bluestem grass communities in the Ouachita Mountains of Arkansas and Oklahoma. Currently, the only active RCW clusters on the Ouachita NF are limited to restored shortleaf pine-bluestem communities within Management Area 22 in Arkansas (USDI 2000). There are also three active RCW clusters on the Crossett Experimental Forest in Crossett, Arkansas, that are considered stable. Within MA 22 in Arkansas, there has been a steady increase in the number of active RCW clusters, from 10 to 35 clusters from 1990 to 2004.

Determination of Direct, Indirect, and Cumulative Effects

The influence of Ouachita NF management activities on Red-cockaded Woodpecker is summarized here. Refer to Table 3 from more information about each "Potential Forest Management Activity" category.

Potential Forest Management Activities (as listed in Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Prescribed Fire				X	
Timber Harvest & Regeneration Activities				X	
Forest Regeneration Site Preparation				X	
Herbicide	X				
Construction, Reconstruction, Maintenance		X			
Other Ground-Disturbing Activities		X			
Decommissioning and Rehabilitating	X				

Direct effects to RCWs could include disturbance of individuals related to forest management activities, such as timber harvest, road or fireline construction, or prescribed fire. However, for the period of 1998-2002, all RCW habitats managed with prescribed fire included 6,195 active clusters with no loss of nests. The Revised Recovery Plan increases the protection standard (area raked around each roost tree) above those used during the compilation of the data cited above. Therefore, the potential for direct effects to RCWs during nesting season due to prescribed fire is insignificant and discountable, with standard mitigations given in the Recovery Plan. Avoidance of prescribed burning during the nesting season is not recommended, since nesting season coincides with timing favorable for other important ecological fire effects.

Indirect effects to RCWs occur at the landscape level and at the population level. There will be beneficial effects of the habitat management actions to RCW habitats and populations. Detrimental habitat isolation and fragmentation effects will be reduced as suitable habitat areas are enlarged and joined across the Habitat Management Areas. Population expansion will be fostered by: restoration of off-site pine stands with native pine species; regeneration of limited mature pine stands with retention of potential roost trees; thinning of mid-successional and mature pine and pine-hardwood stands; prescribed burning to remove encroaching woody vegetation and restore herbaceous groundcovers; chemical and mechanical treatment of encroaching midstory where fire is not a viable management tool; installation of artificial roosting and nesting cavities; protection of artificial and natural cavities from competitors through the installation of excluder devices; capture, banding and monitoring of individual birds to facilitate monitoring of the population; and translocation of birds as necessary to optimize annual reproduction.

Cumulative effects to RCW populations over the long-term are expected to be population growth at rates prescribed in the Revised Recovery Plan, Recovery Plan population objective attainment, and ultimately, recovery of the species. Management direction for RCW populations on the Ouachita NF in Arkansas and Oklahoma will be according to the RCW EIS Record of Decision and the Revised Recovery Plan as required by the Endangered Species Act. Habitat Management Areas for RCWs have been established

through Forest Plan amendments following direction in the EIS Record of Decision and Revised Recovery Plan for RCWs. Management direction for RCWs has been incorporated in the Revised Forest Plan through the continued allocation of acres to Management Area 22, with its accompanying detailed standards.

Beneficial management actions required to implement the RCW direction include: the harvesting of timber, including thinning and regeneration; the use of mechanical, chemical and prescribed burning for control of midstory and hardwood encroachment; the installation of artificial roosting and nesting cavities; the protection of artificial and natural cavities from competitors through the installation of excluder devices; the capture, banding and monitoring of individual birds; the translocation of birds from donor populations to recipient populations; and intra-population translocations, as necessary to optimize annual reproduction.

Mitigation actions required under the RCW direction for habitat management include: protection of active and inactive cavity trees within burn units; utilization of two-aged regeneration method rather than clear-cutting; rotation ages not less than 120 years for shortleaf pine; limitation of regeneration area size; and limitation of operable season to avoid nesting and brood-rearing periods in active clusters. Implementation of the Revised Land and Resource Management Plan for the Ouachita National Forest is not likely to adversely affect the RCW, as residual potential risks to individuals after full implementation of protective measures are insignificant and discountable.

There are two reasons why a determination of “not likely to adversely affect” is made for the Red-cockaded Woodpecker:

First, in addition to following the mitigation actions required under the Revised Red-cockaded Woodpecker Recovery Plan, the following standards have been developed for the Ouachita NF pine-bluestem restoration efforts to treat RCW habitat in MA 22.

Cavity Tree Clusters

- 22.01 An active RCW cavity tree cluster is defined as the minimum convex polygon containing all cavity trees in use by a group of RCWs plus at least a 200-foot wide buffer of continuous forest; each minimum convex polygon plus its buffer is at least 10 acres in size. Active RCW clusters, recruitment stands, and recruitment clusters are all unsuitable for timber production. Active RCW clusters will be protected from disturbance by thinning, tree skidding, or midstory reduction treatments during nesting, which occurs on the Ouachita National Forest from approximately April 1 to July 1. These general dates will be used unless there is more specific nesting season information for the group involved. All trees within a cluster that has cavities actively used or suitable for use by RCWs will be protected insofar as possible from damage.
- 22.02 Replacement stands will be designated and managed for each active RCW cavity tree cluster and its associated potential breeding group as future nesting habitat. The selection criteria for these replacement stands include stands that: 1) are at least 10 acres in size; 2) are suitable for nesting, considering stand age, forest type and availability of relicts; considering stand age, forest type and availability of relicts; 3) are adjacent to or within one-half mile of the active cluster; and 4) are 20 to 30 years younger than the cavity tree cluster to be replaced. Replacement stands are not required to have additional designated

foraging acres. Inactive RCW clusters may be designated as replacement stands.

- 22.03 Recruitment clusters will be established at the rate of at least 10 percent of the total number of active clusters in the ONF population. These recruitment clusters will be provisioned with serviceable cavities. Inactive or abandoned cavity tree clusters may be designated as recruitment clusters.
- 22.04 Recruitment stands will be designated within $\frac{1}{4}$ to $\frac{1}{2}$ mile from an active cluster, recruitment cluster or other recruitment stand when the RCW population is below the population objective. These stands will occur at a rate determined by subtracting the sum of the number of active clusters and recruitment clusters from the population objective (400 clusters in Arkansas, 50 in Oklahoma). Recruitment stands would be designated but would not have to be provisioned with serviceable cavities. Recruitment stands would otherwise have to meet nesting habitat requirements, including adequate associated foraging habitat.
- 22.05 Consistent with Management Area 9 direction, vegetation management treatments (e.g., basal area reduction, midstory reduction) may be performed within streamside management areas to the extent that nesting habitat in the vicinity of cavity trees needs to be improved. The intent of this standard is NOT to treat all streamside areas, only those of critical value as RCW nesting habitat.

Foraging Habitat

- 22.06 MA 22 will be managed to provide "good quality foraging habitat," as defined in the Revised Recovery Plan for the Red-cockaded Woodpecker (see Appendix E of this document).
- 22.07 For RCW clusters on National Forest (NF) land in which the one-half mile foraging zone overlaps with non-NF land, 100 percent of the foraging habitat will be provided on NF land unless there is an agreement with the landowner(s) (which may include state government agencies).

Livestock Grazing

- 22.08 Livestock grazing may utilize up to 25 percent of the annual forage growth, but will not exceed this amount.

Silviculture

- 22.09 For any planned timber harvest, the following priorities will be used to select pine trees for retention:
- 1) Relict trees
 - 2) Potential cavity trees
 - 3) Trees 9.6 inches and greater dbh
 - 4) Trees less than 9.6 inches dbh

- 22.10 To minimize fragmentation of RCW habitat, no more than 20 percent of the area within one-fourth mile radius of an active RCW cluster(45 of 220 acres), including non-NF land, can be less than 30 years old. If the acreage of undesirable RCW habitat condition exceeds 20 percent, regeneration must be deferred.
- 22.11 Within RCW management areas (HMAs), a modified shelterwood or modified seedtree method of harvest will be used to regenerate native shortleaf pine, retaining from 10 to 30 square feet of residual pine basal area. Stands selected for such regeneration harvests will not exceed 25 acres in MA22a or 40 acres in MA22b.
- 22.12 Within RCW HMAs and consistent with Forest-wide direction, clearcutting may be used to remove off-site loblolly pine and regenerate shortleaf pine-dominated forests. Clearcut restoration areas will not exceed 40 acres if they occur within one mile of an active RCW cavity tree cluster, or 80 acres otherwise.
- 22.13 Conduct modified even-aged regeneration cutting in at least 4 percent and no more than 8.3 percent of the suitable pine forest acreage within project areas per 10-year entry cycle. The goal of this standard is to insure long-term perpetuation of suitable habitat.
- 22.14 Regeneration will not occur in the oldest one-third of the age classes unless they contain more acres than needed for a balanced age-class distribution or they exceed the rotation age of 120 years.
- 22.15 Active RCW clusters, replacement stands, recruitment stands, and recruitment clusters are unsuitable for timber production.
- 22.16 Thin stands to increase their suitability as RCW habitat, to reduce SPB risk, and to promote other species or attributes associated with open understories.
- 22.17 In active, inactive, and recruitment clusters, retain no more than 10 square feet of basal area per acre in overstory hardwoods. Remove all hardwoods within 50 feet of cavity trees.

[Forest Plan] Table 3.22 Even-Aged Management in MA 22

Management Area		Maximum Size of Regeneration Area (Acres) ^{1, 2, 3}		Approximate Harvest Age		
		Pine, Pine-Hardwood	Hardwood, Hardwood-Pine	Pine, Pine-Hardwood	Hardwood, Hardwood-Pine	
					Site Index < 80	Site Index > 80
22	a	25	10	120	70-100	100-130
	b	80	10	120	70-100	100-130

¹ Maximum size of regeneration opening **may be exceeded** with approval from the Forest Supervisor up to a maximum of 80 acres for pine, pine/hardwood and 40 acres for hardwood and hardwood/pine.

² Approximate regeneration harvest age **will be 35 years** in loblolly pine stands when completing a final harvest cut intended for plant community restoration.

³ Acreage limitations for regeneration harvest cuts **do not apply** within areas affected by severe natural catastrophic events nor are they applicable where acquired lands have been cut-over prior to Forest Service acquisition.

Second, the revised Forest Plan allows for incorporating areas where RCW clusters become established outside of MA 22 into the MA 22 management regime as per the following standard.

Red-cockaded Woodpecker Outside of Management Area 22

TE001 If Red-cockaded Woodpecker clusters become established naturally on national forest lands outside of **but within** five miles of the current boundaries of MA 22 (Renewal of the Shortleaf Pine-Bluestem Grass Ecosystem and Red-cockaded Woodpecker Habitat), **such lands** will be added to MA 22, except where a new cluster appears in wilderness or other areas that limit such management (in which case, consultation with the U.S. Fish and Wildlife Service will be initiated). See MA 22 for additional design criteria related to the Red-cockaded Woodpecker.

Environmental Baseline and Potential Effects for the Semi-Aquatic and Aquatic Species Evaluated in this Biological Assessment

American alligator (*Alligator mississippiensis*)

Environmental Baseline

The American alligator ranges across southeastern North America. With enforcement of protective legislation, populations **have shown** rapid recovery from habitat loss and over hunting and are stable or increasing in most of its range. Even though the American alligator is no longer biologically **Endangered** or **Threatened**, it is still listed by the USFWS as **Threatened** throughout its entire range due to the similarity of appearance to other **Endangered** or **Threatened** crocodilians. It now seems secure from extinction and was pronounced fully recovered in 1987.

Alligators play a vital role in wetland wildlife communities. Their deep water holes are important for other wildlife, especially during drought. They help control populations of many nuisance animals and are also **valuable** for biomedical studies (NatureServe 2000). The only suitable or potential habitat for this species occurring on the Ouachita

NF is within the West Gulf Coastal Plain Wet Hardwood Flatwoods of the Red Slough Wildlife Management Area (WMA) of southeastern Oklahoma, where it has been seen in streams and ditches that run through the WMA (Wilson 1995; Conant and Collins 1998; Trauth et al. 2004). At least one alligator has also been observed in Broken Bow Lake in Oklahoma. There is little to no suitable habitat for this species on nearby lands, and the American alligator is not known to reproduce on the Ouachita NF.

Determination of Direct, Indirect, and Cumulative Effects

Because the Red Slough WMA is slated for continued and enhanced maintenance as a wildlife emphasis area under the preferred alternative, and there are no resident or breeding individuals known to occur on the Ouachita NF, there would be no direct, indirect, or cumulative effects. A determination of “no effect” is made for the American alligator.

Winged Mapleleaf (*Quadrula fragosa*)

Environmental Baseline

The winged mapleleaf freshwater mussel is not known but is believed to occur within the Ouachita National Forest in both Oklahoma and Arkansas. Chemical and organic pollution, alteration and inundation of river channels and siltation continue to have a severe negative impact on this species elsewhere in its range. Commercial harvest of shells may also be a threat. The winged mapleleaf is considered to be sensitive to pollution, siltation, habitat perturbation, and loss of glochidial host.

Determination of Direct, Indirect, and Cumulative Effects and Findings

Since there are no element occurrence records for this species on the Forest, it was analyzed in relation to its rangewide status and distribution. Populations were discovered approximately 50 miles downstream from the Forest in the Ouachita River and approximately 100 miles downstream in the Saline River so recently (2000-2004) that it is difficult to determine trends, but the low numbers of individuals and limited distribution indicate that the populations are in a precarious position.

Forest-wide resource management standards previously listed, particularly concerning “Soil and Water Resources” and “Management Area 9 (Water and Riparian Communities)” concerning the conservation of soil productivity, water quality and other aquatic resources, provide for the conservation of the potential winged mapleleaf aquatic habitat. Since there are no individuals known to occur on the Ouachita NF, there would be no direct, indirect, or discernable negative cumulative effects. A determination of “no effect” is made for the winged mapleleaf.

Ouachita Rock-Pocketbook (*Arkansia wheeleri*)

Environmental Baseline

Populations of this freshwater mussel are known to occur in the Kiamichi and Glover Rivers in Oklahoma and the Little River system in Oklahoma and Arkansas. Although it is not found within the Forest boundary, the Ouachita rock-pocketbook is known to occur within close proximity and downstream of the Forest (USDA FS 2000). The potential for occurrence on the National Forest along with the federally Endangered status of this species makes it a species of viability concern for the Forest.

The Ouachita rock-pocketbook is known to occur downstream of Forest ownership in the Kiamichi, Lower Little River, and Flat Creek 5th level watershed (HUC) streams. The streams within these watersheds are considered of moderate value to the viability of the Ouachita rock-pocketbook mussel range-wide. The Kiamichi Headwaters watershed is in very good condition with low risk of detrimental influences to species viability—Outcome 1.

As explained in more detail in the EIS, these viability determinations “incorporate elements of species distribution, abundance, and sensitivities to environmental factors; watershed condition relative to the species’ environmental sensitivities; and the national forest role in the watershed.” The viability determinations referred to in this Biological Assessment are defined as follows:

Outcome 1. Species occur within the watershed with minimal impairment. Likelihood of maintaining viability is high.

Outcome 2. Species viability is potentially at risk in the watershed; however, the extent and location of Ouachita National Forest lands with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is moderate.

Outcome 3. Species viability is potentially at risk within the watershed; however, the extent and location of Ouachita National Forest lands with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

Outcome 4. The species is so rare within the watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of Ouachita National Forest lands with respect to the species is conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is moderate to low.

Outcome 5. The species is so rare within the watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of Ouachita National Forest lands with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed. Therefore, likelihood of maintaining viability is low.

The Ouachita rock-pocketbook is so rare within the Lower Little River and Flat Creek watersheds (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of Ouachita National Forest lands with respect to the species is NOT conducive to positively influencing the viability of the species within these watersheds—Outcome 5.

Table 5 displays the known occurrences of Ouachita rock-pocketbook mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, risk to species viability from predicted sediment increase by watershed, and importance of National Forest lands.

Table 5. Watershed Occurrences and Importance of National Forest Lands for the Ouachita Rock-Pocketbook Mussel

Species	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from predicted increased sediment	NFS Ownership Importance
Ouachita Rock-Pocketbook (<i>Arkansia wheeleri</i>)	Kiamichi Headwaters	Moderate	49.83	Low	Outcome 1
	Lower Little River	Moderate	1.91	High	Outcome 5
	Flat Creek	Moderate	2.56	High	Outcome 5

Determination of Direct, Indirect, and Cumulative Effects and Findings

The influence of Ouachita NF management activities on Ouachita Rock-Pocketbook is summarized here. Refer to Table 3 for more information about each “Potential Forest Management Activity” category.

Potential Forest Management Activities (as listed in Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Prescribed Fire	X				
Timber Harvest & Regeneration Activities		X			
Forest Regeneration Site Preparation		X			
Herbicide	X				
Construction, Reconstruction, Maintenance		X			
Other Ground-Disturbing Activities		X			
Decommissioning & Rehabilitating		X			

There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from national forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards (enumerated previously) designed to protect water quality and aquatic habitats. Over time, the cumulative effects of national forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species.

A determination of “not likely to adversely affect” is made for the Ouachita rock-pocketbook, because the proposed Revised Forest Plan provides for habitat conditions beneficial to this species with standards that:

- (1) restore, conserve, maintain or improve the stability and function of riparian communities
- (2) protect soil and water quality
- (3) minimize soil movement caused by management activities
- (4) maintain streambank and channel stability
- (5) maintain free-flowing waters to allow for aquatic organisms’ passage.

Scaleshell Mussel (*Leptodea leptodon*)

Environmental Baseline

The scaleshell mussel is poorly known, difficult to detect, and extremely rare. It is known to have occurred within the Forest, but distribution and densities are not well understood (USDA FS 2000). The scaleshell mussel is found with increasing difficulty and so rarely that the individuals do not appear to be members of viable populations (no evidence of recent reproduction).

The scaleshell mussel was historically found to occur in the South Fork Fourche and Beech 5th level watershed (HUC) streams. These streams are considered of moderate value to the viability of the scaleshell mussel range-wide. The species is so rare within the South Fork Fourche watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of Ouachita National Forest lands with respect to the species is conducive to positively influencing the viability of the species within this watershed—Outcome 4. (See Ouachita rock-pocketbook section for definitions of Outcomes.)

The species is so rare within the Beech watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of

Ouachita National Forest lands with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed—Outcome 3.

Table 6 displays the known occurrences of scaleshell mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, risk to species viability from predicted sediment increase by watershed, and importance of National Forest lands.

Table 6. Watershed Occurrences and Importance of National Forest Lands for the Scaleshell Mussel

Species Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from predicted increased sediment	NFS Ownership Importance
Scaleshell (<i>Leptodea leptodon</i>)	South Fork Fourche	Moderate	54.26	Moderate	Outcome 4
	Beech	Moderate	15.31	Moderate-High	Outcome 3

Determination of Direct, Indirect, and Cumulative Effects and Findings

The influence of Ouachita NF management activities on the Scaleshell Mussel is summarized here. Refer to Table 3 for more information about each “Potential Forest Management Activity” category.

Potential Forest Management Activities (as listed in Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Prescribed Fire	X				
Timber Harvest & Regeneration Activities		X			
Forest Regeneration Site Preparation		X			
Herbicide	X				
Construction, Reconstruction, Maintenance		X			
Other Ground-Disturbing Activities		X			
Decommissioning and Rehabilitating		X			

There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from national forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards (enumerated

previously) designed to protect water quality and aquatic habitats. Over time, the cumulative effects of national forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species.

A determination of “not likely to adversely affect” is made for the scaleshell mussel, because the proposed Revised Forest Plan provides for habitat conditions beneficial to this species with standards that:

- (1) restore, conserve, maintain or improve the stability and function of riparian communities
- (2) protect soil and water quality
- (3) minimize soil movement caused by management activities
- (4) maintain streambank and channel stability
- (5) maintain free-flowing waters to allow for aquatic organisms’ passage.

Pink Mucket (*Lampsilis abrupta*)

Environmental Baseline

The federally endangered pink mucket mussel was historically known from 25 rivers and tributaries; in 1990, it was known from only 16 rivers and tributaries. This species has never been collected in large numbers from any one site or drainage, and most surveys only find one to five individuals. There are taxonomic concerns that Louisiana, Arkansas, and Missouri populations may represent another undescribed species. If populations west of the Mississippi River prove to be a different species, the rank will need to be reevaluated (NatureServe 2000).

Records indicate occurrences in the upper Ouachita watershed below Rammel Dam, which is the third major impoundment on the Ouachita River downstream from the Forest. The species is very rare in Arkansas, and while it is likely that the species historically tended to occur in low numbers, the lack of recruitment and the difficulty with which it is found indicate that the species continues to decline in the state (USDA FS 2000).

The pink mucket has rarely been found to occur in the Poteau Headwaters and Flat Creek 5th level watershed (HUC) streams. These streams are considered of high value to the viability of this mussel on the Forest, but of moderate-to-low viability value range-wide.

The species is so rare within the Poteau Headwaters watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of Ouachita National Forest lands with respect to the species is conducive to positively influencing the viability of the species within this watershed—Outcome 4. (See Ouachita rock-pocketbook section for definitions of Outcomes.)

The species is so rare within the Flat Creek watershed (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of Ouachita National Forest lands with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed—Outcome 5.

Table 7 displays the known occurrences of pink mucket mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, risk to species viability from predicted sediment increase by watershed, and importance of National Forest lands.

Table 7. Watershed Occurrences and Importance of National Forest Lands for the Pink Mucket Mussel

Species Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from predicted increased sediment	NFS Ownership Importance
Pink Mucket (<i>Lampsilis abrupta</i>)	Poteau Headwaters	High	36.26	Moderate	Outcome 4
	Flat Creek	High	2.56	High	Outcome 5

Determination of Direct, Indirect, and Cumulative Effects and Findings

The influence of Ouachita NF management activities on the Pink Mucket is summarized here. Refer to Table 3 for more information about each “Potential Forest Management Activity” category.

Potential Forest Management Activities (as listed in Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Prescribed Fire	X				
Timber Harvest & Regeneration Activities		X			
Forest Regeneration Site Preparation		X			
Herbicide	X				
Construction, Reconstruction, Maintenance		X			
Other Ground-Disturbing Activities		X			
Decommissioning and Rehabilitating		X			

There is a slight possibility that individual mussels could be killed directly by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from national forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards (enumerated previously) designed to protect water quality and aquatic habitats. Over time, the cumulative effects of national forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species.

A determination of “not likely to adversely affect” is made for the pink mucket mussel, because the proposed Revised Forest Plan provides for habitat conditions beneficial to this species with standards that:

- (1) restore, conserve, maintain or improve the stability and function of riparian communities
- (2) protect soil and water quality
- (3) minimize soil movement caused by management activities
- (4) maintain streambank and channel stability
- (5) maintain free-flowing waters to allow for aquatic organisms’ passage.

Arkansas Fatmucket (*Lampsilis powellii*)

Environmental Baseline

Arkansas fatmucket mussels live only in Arkansas and are endemic to the Saline, Caddo, and upper Ouachita Rivers (USDA FS 2000; USDI FWS 1992). Historically, this mussel species was found to be relatively common in preferred habitat; however, its frequency of detection and its population sizes have been consistently decreasing (Harris 1994; Harris 2000; Harris et al. 1997; Harris and Gordon 1998).

The Arkansas fatmucket is known to occur in the Irons Fork, Kates Creek, Muddy Fiddler, South Fork Ouachita, Blakely, Caddo Headwaters, Carney Creek, Alum Fork, North Fork Saline, and Middle Fork Saline 5th level watershed (HUC) streams. Alum Fork and Kates Creek are considered of high value to the viability of the Arkansas fatmucket. Irons Fork, Muddy Fiddler, Caddo Headwaters, Carney Creek, North Fork Saline, and Middle Fork Saline watersheds are considered of moderate value to the viability of this mussel range-wide, and Blakely is considered of low value to this species viability. All ten of these watersheds are in very good condition with low vulnerability to detrimental influences relative to all watersheds within the Forest; therefore, likelihood of adversely affecting current viability is moderate to low—Outcome 5. (See Ouachita rock-pocketbook section for definitions of Outcomes.)

This species is so rare and appears to be in decline in all watersheds where it is known to occur (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the South Fork

Ouachita watershed at risk. The extent and location of Ouachita National Forest lands with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed—Outcome 4.

Table 8 displays the known occurrences of Arkansas fatmucket mussel by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, risk to species viability from predicted sediment increase by watershed, and importance of National Forest lands.

Table 8. Watershed Occurrences and Importance of National Forest Lands for the Arkansas Fatmucket Mussel

Species	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from predicted increased sediment	NFS Ownership Importance
Arkansas Fatmucket (<i>Lampsilis powellii</i>)	Kates Creek	High	44.79	Moderate	Outcome 5
	South Fork Ouachita	High	66.43	Moderate	Outcome 4
	Alum Fork	High	30.03	Moderate	Outcome 5
	Irons Fork	Moderate	37.90	Moderate	Outcome 5
	Muddy Fiddler	Moderate	72.54	Moderate	Outcome 5
	Caddo Headwaters	Moderate	64.12	Moderate	Outcome 5
	Carney Creek	Moderate	14.79	Moderate	Outcome 5
	North Fork Saline	Moderate	23.07	Moderate	Outcome 5
	Middle Fork Saline	Moderate	12.17	Moderate	Outcome 5
	Blakely	Low	48.49	Moderate	Outcome 5

Determination of Direct, Indirect, and Cumulative Effects and Findings

The influence of Ouachita NF management activities on the Arkansas Fatmucket is summarized here. Refer to Table 3 for more information about each “Potential Forest Management Activity” category.

Potential Forest Management Activities (as listed in Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Prescribed Fire	X				
Timber Harvest & Regeneration Activities		X			
Forest Regeneration Site Preparation		X			
Herbicide	X				
Construction, Reconstruction,		X			

Potential Forest Management Activities (as listed in Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Maintenance					
Other Ground-Disturbing Activities		X			
Decommissioning and Rehabilitating		X			

There is a slight possibility that individual mussels could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from national forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards (enumerated previously) designed to protect water quality and aquatic habitats. Over time, the cumulative effects of national forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species.

A determination of "not likely to adversely affect" is made for the Arkansas fatmucket mussel, because the proposed Revised Forest Plan provides for habitat conditions beneficial to this species with standards that:

- (1) restore, conserve, maintain or improve the stability and function of riparian communities
- (2) protect soil and water quality
- (3) minimize soil movement caused by management activities
- (4) maintain streambank and channel stability
- (5) maintain free-flowing waters to allow for aquatic organisms' passage.

Harperella (*Ptilimnium nodosum*)

Environmental Baseline

Populations of harperella (*Ptilimnium nodosum*) on the Forest are limited to stream/river channels. This federally listed endangered vascular plant was first discovered on the Forest in September 1990. It is currently known from 11 locations on Forest lands on the Oden, Cold Springs, and Fourche Ranger Districts in Garland, Montgomery, Scott, and Yell Counties, as well as three privately owned sites (Susan Hooks, personal communication, 28 July 2005).

It typically grows on rocky shoals, within crevices in exposed bedrock, and occasionally along sheltered muddy banks. It seems to exhibit a preference for the downstream margins of small pools or other spots of deposition of fine alluvium. In most harperella

sites, there seems to be significant deposition of fine silts. It may occur in mostly sunny to mostly shaded sites. On the Forest, harperella occurs in perennial to near-perennial streams either on or among boulders or large cobbles, or on coarse sediment bars.

Where harperella exists on the Forest and elsewhere throughout its range, population numbers often fluctuate from year-to-year in response to factors such as rainfall levels, and winter conditions affecting seedlings and drought. There is significant dynamism in the persistence of individual stands with population levels documented to have fluctuated as much as 30 percent in four years (USFWS 1991). A recent status report by Hardcastle and Williams (2001) used repeatable methods to estimate populations in the Ouachita National Forest. Potential and existing habitat conditions for this species frequently change with flood events and are not readily quantifiable. The assumption has been made that this species may occur wherever suitable habitat exists within perennial stream channels.

Harperella is known to occur in the Cedar Creek, North Fork Ouachita and South Fork Fourche, and Muddy Fiddler 5th level watershed (HUC) streams. These four watersheds are considered of critical value to the viability of harperella. All four of these watersheds are in very good condition with low vulnerability to detrimental influences relative to all watersheds within the Forest; therefore, likelihood of adversely affecting current viability is low.

South Fork Fourche watershed reflects minimal impairment, but the known harperella occurrences are located on lands in private individual ownership. Species viability is potentially at risk in the watershed; however, the extent and location of Ouachita National Forest lands with respect to the species is conducive to positively influencing the viability of the species within this watershed—Outcome 3. (See Ouachita rock-pocketbook section for definitions of Outcomes.)

Cedar Creek, North Fork Ouachita, and Muddy Fiddler also reflect minimal impairment; the harperella localities are located on lands in Forest ownership, where likelihood of maintaining viability is high—Outcome 1.

Table 9 displays the known occurrences of harperella by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, risk to species viability from predicted sediment increase by watershed, and importance of National Forest lands.

Table 9. Watershed Occurrences and Importance of National Forest Lands for Harperella

Common Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from predicted increased sediment	NFS Ownership Importance
Harperella (<i>Ptilimnium nodosum</i>)	Cedar Creek	Critical	80.50	Low	Outcome 1
	South Fork Fourche	Critical	54.26	Low	Outcome 3
	Muddy Fiddler	Critical	72.54	Low	Outcome 1
	North Fork Ouachita	Critical	71.41	Low	Outcome 1

Determination of Direct, Indirect, and Cumulative Effects and Findings

The influence of Ouachita NF management activities on Harperella is summarized here. Refer to Table 3 for more information about each "Potential Forest Management Activity" category.

Potential Forest Management Activities (as listed in Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Prescribed Fire	X				
Timber Harvest & Regeneration Activities		X			
Forest Regeneration Site Preparation		X			
Herbicide	X				
Construction, Reconstruction, Maintenance		X			
Other Ground-Disturbing Activities		X			
Decommissioning and Rehabilitating		X			

There is a slight possibility that individual plants could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from national forest management activities is predicted to have no or discountable effects on aquatic habitat due to forest-wide and management area specific standards (enumerated previously) designed to protect water quality and aquatic habitats. Over time, the cumulative effects of national forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species.

A determination of “not likely to adversely affect” is made for harperella, because the proposed Revised Forest Plan provides for habitat conditions beneficial to this species with standards that:

- (1) restore, conserve, maintain or improve the stability and function of riparian communities
- (2) protect soil and water quality
- (3) minimize soil movement caused by management activities
- (4) maintain streambank and channel stability
- (5) maintain free-flowing waters to allow for aquatic organisms’ passage.

Leopard Darter (*Percina pantherina*)

Environmental Baseline

The federally threatened leopard darter is endemic to the Little River system in Arkansas and Oklahoma. While often quite abundant in its preferred habitats, the leopard darter habitat is usually restricted to small areas and can be quite disjunct. The leopard darter is generally found to occur in small to moderate-sized clear upland streams and rivers of moderate gradient. During non-spawning periods, it is usually found in pools of creeks and rivers favoring the cobble, small boulder habitat in the shallow areas of pools near the end of riffles. They are known to seek out the deep, cool pools during the hottest summer months (USDA FS 2000).

The leopard darter has historically had very limited distribution, and is known to occur only in portions of five small, swift streams: the Cossatot River and Robinson Fork (the Rolling Fork River) in Arkansas; Glover and Little Rivers in Oklahoma; and the Mountain Fork River in both states (Robison and Buchanan 1988). Unfortunately, this restricted range was further reduced by impoundments of three rivers, forming Lakes Gillham, Broken Bow, and Pine Creek (USDA FS 2000). Leopard darter habitat below the dams was decimated by reservoir releases.

The leopard darter is known to occur in the Glover, Two-mile, Beech, Broken Bow Lake, Upper Rolling Fork, and Cossatot Headwaters 5th level watershed (HUC) streams. The first four watersheds are considered of critical value to the viability of the leopard darter, and the last two of moderate value. All six of these watersheds are in very good condition with low vulnerability to detrimental influences relative to all watersheds within the Forest; therefore, likelihood of adversely affecting current viability from Forest management activities is low—Outcome 4. (See Ouachita rock-pocketbook section for definitions of Outcomes.)

This species is fairly rare in all watersheds where it is known to occur (population is at very low density and/or at only a few local sites) that random events (accidents, weather events) may place persistence of the species within the watershed at risk. The extent and location of

Ouachita National Forest lands with respect to the species is NOT conducive to positively influencing the viability of the species within this watershed—Outcome 5.

Table 10 displays the known occurrences of leopard darter by watershed, the importance of the 5th level HUC to the species, percent National Forest System ownership within the HUC, risk to species viability from predicted sediment increase by watershed, and importance of National Forest lands.

Table 10. Watershed Occurrences and Forest Ownership Importance for the Leopard Darter

Species	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent National Forest	Risk to Species Viability from predicted increased sediment	NFS Ownership Importance
Leopard Darter (<i>Percina pantherina</i>)	Glover	Critical	16.82	Low	Outcome 5
	Two-mile	Critical	40.16	Low	Outcome 4
	Beech	Critical	15.31	Low	Outcome 5
	Broken Bow Lake	Critical	29.32	Low	Outcome 5
	Upper Rolling Fork	Moderate	0.14	Low	Outcome 5
	Cossatot Headwaters	Moderate	31.46	Low	Outcome 5

Determination of Direct, Indirect, and Cumulative Effects and Findings

The influence of Ouachita NF management activities on the leopard darter is summarized here. Refer to Table 3 for more information about each “Potential Forest Management Activity” category.

Potential Forest Management Activities (as listed in Table 3)	No Effect	Not Likely to Adversely Affect			Likely to Adversely Affect
		Discountable	Insignificant	Beneficial	
Prescribed Fire	X				
Timber Harvest & Regeneration Activities		X			
Forest Regeneration Site Preparation		X			
Herbicide	X				
Construction, Reconstruction, Maintenance		X			
Other Ground-Disturbing Activities		X			
Decommissioning and Rehabilitating		X			

There is a slight possibility that individual eggs, larva and/or adults could be directly harmed by vehicles crossing streams. Indirect effects could include creation of barriers to passage of the fish host and/or excessive sedimentation from ground disturbing activities that might compromise the quality of the aquatic habitat. Cumulatively, sedimentation from national forest management activities is predicted to have no or discountable effects on mussel habitat due to forest-wide and management area specific standards (enumerated previously) designed to protect water quality and aquatic habitats. Over time, the cumulative effects of national forest management, including watershed, riparian area, and aquatic habitat management and restoration actions are expected to be beneficial for this species.

A determination of “not likely to adversely affect” is made for the leopard darter, because the proposed Revised Forest Plan provides for habitat conditions beneficial to this species with standards that:

- (1) restore, conserve, maintain or improve the stability and function of riparian communities
- (2) protect soil and water quality
- (3) minimize soil movement caused by management activities
- (4) maintain streambank and channel stability
- (5) maintain free-flowing waters to allow for aquatic organisms’ passage.

Critical Habitat for the Leopard Darter (*Percina pantherina*)

Environmental Baseline

The U.S. Fish and Wildlife Service designated Critical Habitat in the Little River system for the leopard darter (USFWS 1984). Those segments occurring within the Ouachita NF are:

- (1) a 16.5-mile segment of the Glover River, the last free-flowing river in Oklahoma, and
- (2) almost two miles of the Mountain Fork River upstream from Broken Bow Lake.

Both of these Critical Habitat segments occur within Ouachita NF Management Area 20—Wild and Scenic River Corridors. Little vegetation management activities is planned for these corridors, as these areas are unsuitable in their entirety for timber production.

Standards applicable to all of Management Area 20—Wild and Scenic River Corridors

- 20.01 Until designation decisions are made or additional river studies are completed, National Forest System lands associated with eligible river corridors (see tables within Management Area 20) will be managed to perpetuate their eligibility for designation. Management activities may enhance conditions consistent with maintaining the eligibility of the subject river corridors.
- 20.02 Projects must not include development of hydroelectric power facilities or other impoundments.
- 20.03 Livestock grazing levels will not be increased. Measures will be taken to minimize livestock use of the rivers themselves, including construction of alternative water sources outside the corridors. No livestock distribution facilities or convenience structures (i.e. salting and dusting stations, corrals) will be constructed or placed in MA 20.
- 20.04 Minimize visual impacts from prescribed burns, insect and disease control activities, enhancement plantings, salvage operations, trail construction, and maintenance activities.
- 20.05 No new special uses or permits for utility or transmission lines will be considered unless there is no reasonable alternative, and scenic, recreational, and fish and wildlife values have been evaluated.
- 20.06 Insect and disease control actions will be limited to outbreaks that threaten the scenic character of the corridor or resources values of adjacent federal or non-federal lands. Selected control measures will be those that have the least possible impact on the “outstandingly remarkable” features of the river corridor while still effectively limiting the outbreak.

Standards specific to (20c) the Glover and Mountain Fork Rivers Corridor

- 20c.01 Construction of structures to improve fish and game habitat; river access; grazing; protection from fire, insects, or disease; fuels management (as specified in the Fire Management Plan); and rehabilitation or stabilization of damaged resources must be carried out in such a manner that the outstandingly remarkable values of the river corridor are not impaired. Make no substantial additions to existing improvements or structures, unless necessary for safety or to improve environmental conditions.
- 20c.02 Mining related operations can have no more than one-half acre of surface impact unreclaimed during the course of the operation.
- 20c.03 Construct no major public use areas. Design simple recreation facilities to protect the values of the river area and provide for the safety and convenience of the users in keeping with a natural setting.
- 20c.04 Road construction not associated with recreation development will be limited to temporary roads built to the minimum level to meet resource management needs.

Determination of Direct, Indirect, and Cumulative Effects and Findings

The influence of Ouachita NF management activities on Critical Habitat for the leopard darter is summarized here. Refer to Table 3 for more information about each "Potential Forest Management Activity" category.

Potential Forest Management Activities (as listed in Table 3)	No Effect to Critical Habitat	Not Likely to Adversely Modify Critical Habitat			Likely to Adversely Modify Critical Habitat
		Discountable	Insignificant	Beneficial	
Prescribed Fire	X				
Timber Harvest & Regeneration Activities	X				
Forest Regeneration Site Preparation	X				
Herbicide	X				
Construction, Reconstruction, Maintenance		X			
Other Ground-Disturbing Activities		X			
Decommissioning and Rehabilitating		X			

Excessive sedimentation from ground disturbing activities could but is unlikely to modify or compromise this Critical Habitat. Cumulatively, sedimentation from national forest management activities is predicted to have no or discountable effects on modification of leopard darter Critical Habitat due to forest-wide and management area 20 and management area 9 specific standards (enumerated previously) designed to protect water quality and aquatic habitats. Over time, the cumulative effects of national forest management, including watershed, riparian area, wild and scenic river corridor, and aquatic habitat management and restoration actions are expected to be beneficial for this Critical Habitat.

A determination of "not likely to adversely modify critical habitat" is made for the Critical Habitat for the leopard darter, because the proposed Revised Forest Plan provides measures to assure maintenance efforts beneficial to critical habitat conditions for the leopard darter with standards that:

- (1) restore, conserve, maintain or improve the stability and function of riparian communities
- (2) protect soil and water quality
- (3) minimize soil movement caused by management activities
- (4) maintain streambank and channel stability
- (5) maintain free-flowing waters to allow for aquatic organisms' passage.

Conclusion

The objectives of this Biological Assessment (BA) were to:

Comply with the requirements of the Endangered Species Act (ESA) of 1973, as amended, so that actions by federal agencies will not jeopardize the existence of federally listed species, or destroy, or adversely modify their critical habitat.

Assess the effects that implementation of the revised Forest Plan will have on federally Threatened and Endangered species known to exist on or near the Ouachita NF.

Provide biological input to ensure Ouachita NF compliance with the National Forest Management Act (NFMA) of 1976 and Forest Service Manual (FSM) 2670.

The Forest Service will apply the Forest Plan's applicable standards to protect and conserve these species and their habitats, and will continue consulting with the USFWS on projects as required. This document was prepared in partial fulfillment of requirements of informal and formal consultation with the United States Fish and Wildlife Service.

Date: 02 August 2005

Signature of Lead Preparer:

Betty G. Crump – Ecologist, Planning /s/ *Betty G. Crump*

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Appendix E – Biological Resources

Aquatic species viability determinations incorporate elements of species distribution, abundance and sensitivities to environmental factors; watershed condition relative to the species' environmental sensitivities; and the National Forest role in the watershed. Viability determination outcomes are described in the following tabulation.

Outcome 1	Species occurs within watersheds with no impairment. Likelihood of maintaining viability is high.
Outcome 2	Species is potentially at risk in the watershed; however, Forest Service may influence conditions in the watershed to keep it well distributed. Therefore, likelihood of maintaining viability is moderate.
Outcome 3	Species is potentially at risk within the watershed; however, Forest Service opportunity to affect outcomes for the species in the watershed is limited. Therefore, species viability in the watershed is at risk.
Outcome 4	The species is so rare within the watershed (population is at very low density and/or at only a few local sites) that stochastic events (accidents, weather events, etc.) may place persistence of the species within the watershed at risk. Forest Service may influence conditions in the watershed to keep the species relatively secure. Therefore, likelihood of maintaining viability is moderate to low.
Outcome 5	The species is so rare within the watershed (population is at very low density and/or at only a few local sites) that stochastic events (accidents, weather events, etc.) may place persistence of the species at risk in the watershed. Forest Service opportunity to affect outcomes for the species in the watershed is limited. Therefore, species viability in the watershed is at risk.

Table E.1 Viability Outcome for All Aquatic Species of Viability Concern under All Alternatives on the Ouachita National Forest by Watershed

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Aquatic Plant Species of Viability Concern									
Harperella (Ptilimnium nodosum)	1111020601 Cedar Creek	Critical	80.50	Low	Low	Low	Low	Low	Outcome 2
	1111020605 South Fork Fourche	Critical	54.26	Low	Low	Low	Low		Outcome 2
	804010103 Muddy Fiddler	Critical	72.54	Moderate	Moderate	Low	Low		Outcome 2
	804010105 North Fork Ouachita	Critical	71.41	Moderate	Low	Low	Low		Outcome 2
Crayfish Species of Viability Concern									
A Crayfish (Fallicambarus harpi)	804010109 Little Mazarn	Critical	1.40	High	High	High	Low	Low	Outcome 5
	804010206 Carney Creek	Critical	14.79	Moderate	Moderate	Moderate	Low		
	804010207 South Fork Caddo	Critical	48.97	High	Low	Moderate	Low		
A Crayfish (Fallicambarus jeanae)	804010206 Carney Creek	High	14.79	Moderate	Moderate	Moderate	Low	Low	Outcome 5
	804010302 Greeson	High	2.85	High	Low	Moderate	Low		
A Crayfish (Fallicambarus strawni)	1114010904 Cossatot Headwaters	High	31.46	Moderate	Low	Moderate	Low	Low	Outcome 2
	1114010907 Shady Lake	High	7.14	Moderate	High	Low	Low		Outcome 3
	804010301 Little Missouri Headwaters	High	54.98	High	Low	Moderate	Low		Outcome 2

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
A Crayfish (<i>Orconectes menae</i>)	1114010501 Kiamichi Headwaters	Critical	49.83	Low	Low	Low	Low	Low	Outcome 2
	804010101 Irons Fork	High	37.90	Moderate	High	High	Low		Outcome 2
	804010301 Little Missouri Headwaters	High	54.98	High	Low	Moderate	Low		Outcome 2
A Crayfish (<i>Orconectes saxatilis</i>)	1114010501 Kiamichi Headwaters	High	49.83	Low	Low	Low	Low	Low	Outcome 2
A Crayfish (<i>Procambarus tenuis</i>)	1114010501 Kiamichi Headwaters	Critical	49.83	Low	Low	Low	Low	Low	Outcome 2
	804010101 Irons Fork	Critical	37.90	Moderate	High	High	Low		
A Crayfish (<i>Procambarus reimeri</i>)	804010101 Irons Fork	High	37.90	Moderate	High	High	Low	Low	Outcome 2
Fish Species of Viability Concern									
Crystal Darter (<i>Crystallaria asprella</i>)	1114010705 Lower Little River	High	1.91	Moderate	Moderate	High	Moderate	Moderate	Outcome 5
	1114010901 Flat Creek	High	2.56	Moderate	Low	Moderate	Moderate		Outcome 5
Paleback Darter (<i>Etheostoma pallidorsum</i>)	804010205 Caddo Headwaters	Critical	64.12	Moderate	High	Low	Low	Low	Outcome 2
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 2
	804010206 Carney Creek	High	14.79	Moderate	Moderate	Moderate	Low		Outcome 3
	804010207 South Fork Caddo	High	48.97	High	Low	Moderate	Low		Outcome 2

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Paleback Darter (<i>Etheostoma pallidiorsum</i>) continued	804010107 Lake Hamilton	Moderate	16.10	High	Moderate	High	Low		Outcome 3
	804010108 Mazarn	Moderate	48.11	Low	Moderate	Low	Low		Outcome 2
Goldstripe Darter (<i>Etheostoma parvipinne</i>)	1114010604 Norwood	Critical	10.96	Low	Moderate	Moderate	High	High	Outcome 3
	1114010605 McKinney Creek	Critical	3.73	Low	Moderate	Low	High	High	Outcome 3
	1114010901 Flat Creek	Critical	2.56	Moderate	Low	Moderate	Moderate	Moderate	Outcome 3
	1114010903 Lower Rolling Fork	Critical	1.12	High	Moderate	Moderate	Moderate	Moderate	Outcome 3
	1114010705 Lower Little River	High	1.91	Moderate	Moderate	High	Moderate	Moderate	Outcome 3
Ouachita Mountain Shiner (<i>Lythrurus snelsoni</i>)	1114010805 Broken Bow Lake	Moderate	29.32	Low	Moderate	Low	Low	Low	Outcome 3
	1114010704 Glover	Critical	16.82	Low	Low	Moderate	Low		Outcome 1
	1114010804 Beech	Critical	15.31	Low	Low	Moderate	Low		
	1114010805 Broken Bow Lake	Critical	29.32	Low	Moderate	Low	Low		
	1114010705 Lower Little River	High	1.91	Moderate	Moderate	High	Moderate		Outcome 1
	804010104 South Fork Ouachita	High	66.43	Moderate	High	Moderate	Low		
Redspot Chub (<i>Nocomis asper</i>)									

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Kiamichi Shiner (<i>Notropis ortenburgeri</i>)	1111010501 Poteau Headwaters	Critical	36.24	Moderate	High	High	Moderate	Moderate	Outcome 3
	1111010502 Black Fork	Critical	73.55	Low	Low	Low	Low	Low	Outcome 1
	1111010503 Middle Poteau	Critical	41.22	Moderate	High	Moderate	Low	Low	Outcome 1
	1111010505 Wister	Critical	33.44	Moderate	Moderate	Low	Low	Low	Outcome 1
	1111020601 Cedar Creek	Critical	80.42	Low	Low	Low	Low	Low	Outcome 1
	1114010501 Kiamichi Headwaters	Critical	49.83	Low	Low	Low	Low	Low	Outcome 1
	1114010605 McKinney Creek	Critical	3.73	Low	Moderate	Low	High	High	Outcome 3
	1114010705 Lower Little River	Critical	1.91	Moderate	Moderate	High	Moderate	Moderate	Outcome 3
	1114010805 Broken Bow Lake	Critical	29.32	Low	Moderate	Low	Low	Low	Outcome 1
	1114010901 Flat Creek	Critical	2.56	Moderate	Low	Moderate	Moderate	Moderate	Outcome 3
	1114010902 Upper Rolling Fork	Critical	0.14	Moderate	Low	High	Low	Low	Outcome 1
	1114010903 Lower Rolling Fork	Critical	1.12	High	Moderate	Moderate	Moderate	Moderate	Outcome 3
	804010101 Irons Fork	Critical	37.90	Moderate	High	High	Low	Low	Outcome 1
	1114010704 Glover	High	16.82	Low	Low	Moderate	Low	Low	Outcome 1
	804020301 Alum Fork	High	30.03	Moderate	Low	Moderate	Low	Low	Outcome 1

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Peppered Shiner (<i>Notropis perpalidus</i>)	1114010704 Glover	High	16.82	Low	Low	Moderate	Low	Low	Outcome 3
	1114010705 Lower Little River	High	1.91	Moderate	Moderate	High	Moderate		Outcome 3
	1114010805 Broken Bow Lake	High	29.32	Low	Moderate	Low	Low		Outcome 2
	1114010901 Flat Creek	High	2.56	Moderate	Low	Moderate	Moderate		Outcome 3
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 2
	804010104 South Fork Ouachita	High	66.43	Moderate	High	Moderate	Low		Outcome 2
	804010103 Muddy Fiddler	Moderate	72.54	Moderate	Moderate	Low	Low		Outcome 2
	804010206 Carney Creek	Moderate	14.79	Moderate	Moderate	Moderate	Low		Outcome 3
	804020301 Alum Fork	Critical	30.03	Moderate	Low	Moderate	Low		Outcome 2
	804020302 North Fork Saline	Critical	23.07	Moderate	Low	High	Low		Outcome 3
Ouachita Madtom (<i>Noturus lachneri</i>)	804020303 Middle Fork Saline	Critical	12.17	High	Moderate	High	Low	Low	Outcome 3
	804010207 South Fork Caddo	High	48.97	High	Low	Moderate	Low		Outcome 2

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Caddo Madtom (<i>Noturus taylori</i>)	804010205 Caddo Headwaters	Critical	64.12	Moderate	High	Low	Low	Low	Outcome 1
	804010207 South Fork Caddo	Critical	48.97	High	Low	Moderate	Low		Outcome 1
	804010101 Irons Fork	High	37.90	Moderate	High	High	Low		Outcome 1
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 1
	804010103 Muddy Fiddler	High	72.54	Moderate	Moderate	Low	Low		Outcome 1
	804010104 South Fork Ouachita	High	66.43	Moderate	High	Moderate	Low		Outcome 1
	804010206 Carney Creek	High	14.79	Moderate	Moderate	Moderate	Low		Outcome 3
	804010301 Little Missouri Headwaters	Low	54.98	High	Low	Moderate	Low		Outcome 1
	1111010505 Wister	Critical	33.45	Moderate	Moderate	Low	Low	Moderate	Outcome 4
	1111010506 Riddle Creek	Critical	2.76	Moderate	High	High	High		Outcome 5
Leopard Darter (<i>Percina pantherina</i>)	1114010704 Glover	Critical	16.82	Low	Low	Moderate	Low	Low	Outcome 5
	1114010801 Twomile	Critical	40.16	Moderate	Moderate	Moderate	Low		Outcome 4
	1114010804 Beech	Critical	15.31	Low	Low	Moderate	Low		Outcome 5
	1114010805 Broken Bow Lake	Critical	29.32	Low	Moderate	Low	Low		Outcome 4
	1114010902 Upper Rolling Fork	Moderate	0.14	Moderate	Low	High	Low		Outcome 5

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Ouachita Darter (<i>Percina</i> sp. nov)	1114010904 Cossatot Headwaters	Moderate	31.46	Moderate	Low	Moderate	Low		Outcome 4
	1111020605 South Fork Fourche	High	54.26	Low	Low	Low	Low	Low	Outcome 4
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 4
	804010103 Muddy Fiddler	High	72.54	Moderate	Moderate	Low	Low		Outcome 4
Freshwater Mussel Species of Viability Concern									
Elktoe (<i>Alasmidonta marginata</i>)	804010102 Kates Creek	Critical	44.79	Low	Moderate	Moderate	Low	Low	Outcome 4
	804010103 Muddy Fiddler	Critical	72.54	Moderate	Moderate	Low	Low		Outcome 4
	804010206 Carney Creek	High	14.79	Moderate	Moderate	Moderate	Low		Outcome 5
	804020302 North Fork Saline	High	23.07	Moderate	Low	High	Low		Outcome 5
Flat Floater (<i>Anodonta suborbiculata</i>)	1114010901 Flat Creek	High	2.56	Moderate	Low	Moderate	Moderate	Low	Outcome 3
	804010103 Muddy Fiddler	High	72.54	Moderate	Moderate	Low	Low		Outcome 4
	804010104 South Fork Ouachita	High	66.43	Moderate	High	Moderate	Low		Outcome 4
	804010106 Blakely	High	48.49	Moderate	Low	Low	Low		Outcome 4
Ouachita Rock Pocketbook (<i>Arkansia wheeleri</i>)	1114010501 Kiamichi Headwaters	Moderate	49.83	Low	Low	Low	Low	Moderate	Outcome 1
	1114010705 Lower Little River	Moderate	1.91	Moderate	Moderate	High	Moderate		Outcome 5

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
	1114010901 Flat Creek	Moderate	2.56	Moderate	Low	Moderate	Moderate		Outcome 5
Spectacle Case (<i>Cumberlandia monodonta</i>)	804010103 Muddy Fiddler	Low	72.54	Moderate	Moderate	Low	Low	Low	Outcome 4
Western Fanshell (<i>Cyprogenia aberti</i>)	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low	Low	Outcome 1
	804010103 Muddy Fiddler	High	72.54	Moderate	Moderate	Low	Low		Outcome 1
	804010206 Carney Creek	Moderate	14.79	Moderate	Moderate	Moderate	Low		Outcome 2
	804010106 Blakely	Low	48.49	Moderate	Low	Low	Low		Outcome 1
Butterfly (<i>Ellipsaria lineolata</i>)	1114010705 Lower Little River	High	1.91	Moderate	Moderate	High	Moderate	Moderate	Outcome 3
	1114010901 Flat Creek	High	2.56	Moderate	Low	Moderate	Moderate		Outcome 3
	1111020403 Deadman Creek	Moderate	25.11	Low	High	Moderate	High		Outcome 3
	1114010501 Kiamichi Headwaters	Moderate	49.83	Low	Low	Low	Low		Outcome 1
	1114010704 Glover	Moderate	16.82	Low	Low	Moderate	Low		Outcome 1
	804010206 Carney Creek	Moderate	14.79	Moderate	Moderate	Moderate	Low		Outcome 1
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 1
Spike (<i>Elliptio dilatata</i>)	804010103 Muddy Fiddler	High	72.54	Moderate	Moderate	Low	Low	Low	Outcome 1
	1111010503 Middle Poteau	Moderate	41.24	Moderate	High	Moderate	Low		Outcome 1

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Spike (<i>Elliptio dilatata</i>) continued	1111010505 Wister	Moderate	33.46	Moderate	Moderate	Low	Low		Outcome 1
	1111010506 Riddle Creek	Moderate	2.77	Moderate	High	High	High		Outcome 2
	1111020601 Cedar Creek	Moderate	80.44	Low	Low	Low	Low		Outcome 1
	1111020602 Gafford Creek	Moderate	63.50	Low	High	Low	Low		Outcome 1
	804010104 South Fork Ouachita	Moderate	66.43	Moderate	High	Moderate	Low		Outcome 1
	804010106 Blakely	Moderate	48.49	Moderate	Low	Low	Low		Outcome 1
	804010206 Carney Creek	Moderate	14.79	Moderate	Moderate	Moderate	Low		Outcome 2
	804010301 Little Missouri Headwaters	Moderate	54.98	High	Low	Moderate	Low		Outcome 1
	804010302 Greeson	Moderate	2.85	High	Low	Moderate	Low		Outcome 2
	1111020403 Deadman Creek	Moderate	25.10	Low	High	Moderate	High		Outcome 3
Ebony Shell (<i>Fusconaia ebena</i>)	1114010805 Broken Bow Lake	Moderate	29.32	Low	Moderate	Low	Low	Moderate	Outcome 1
	1114010901 Flat Creek	Moderate	2.56	Moderate	Low	Moderate	Moderate		Outcome 3
	1111010501 Poteau Headwaters	High	36.26	Moderate	High	High	Moderate		Outcome 4
Pink Mucket (<i>Lampsilis abrupta</i>)	1114010901 Flat Creek	High	2.56	Moderate	Low	Moderate	Moderate	Moderate	Outcome 5
	804010101 Irons Fork	Critical	37.90	Moderate	High	High	Low	Low	Outcome 1

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Louisiana Fatmucket (<i>Lampsilis hydlana</i>)	804010102 Kates Creek	Critical	44.79	Low	Moderate	Moderate	Low		Outcome 1
	804010104 South Fork Ouachita	Critical	66.43	Moderate	High	Moderate	Low		Outcome 1
	1111010501 Poteau Headwaters	High	36.27	Moderate	High	Moderate	Moderate		Outcome 1
	1111010503 Middle Poteau	High	41.26	Moderate	High	Moderate	Low		Outcome 1
	1111020601 Cedar Creek	High	80.47	Low	Low	Low	Low		Outcome 1
	1114010704 Glover	High	16.82	Low	Low	Moderate	Low		Outcome 3
	1114010705 Lower Little River	High	1.91	Moderate	Moderate	High	Moderate		Outcome 3
	1114010801 Twomile	High	40.16	Moderate	Moderate	Moderate	Low		Outcome 1
	1114010804 Beech	High	15.31	Low	Low	Moderate	Low		Outcome 3
	1114010805 Broken Bow Lake	High	29.32	Low	Moderate	Low	Low		Outcome 1
Louisiana Fatmucket (<i>Lampsilis hydlana</i>) continued	1114010901 Flat Creek	High	2.56	Moderate	Low	Moderate	Moderate		Outcome 3
	804010103 Muddy Fiddler	High	72.54	Moderate	Moderate	Low	Low		Outcome 1
	804010206 Carney Creek	High	14.79	Moderate	Moderate	Moderate	Low		Outcome 3
	804020301 Alum Fork	High	30.03	Moderate	Low	Moderate	Low		Outcome 1
	804020302 North Fork Saline	High	23.07	Moderate	Low	High	Low		Outcome 3

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Southern Pocketbook (<i>Lampsilis ornata</i>)	804020303 Middle Fork Saline	High	12.17	High	Moderate	High	Low		Outcome 3
	804010106 Blakely	Moderate	48.49	Moderate	Low	Low	Low		Outcome 1
	804010103 Muddy Fiddler	Critical	72.54	Moderate	Moderate	Low	Low	Low	Outcome 2
	804010206 Carney Creek	Critical	14.79	Moderate	Moderate	Moderate	Low		Outcome 3
	804020303 Middle Fork Saline	Critical	12.17	High	Moderate	High	Low		Outcome 3
Arkansas Fatmucket (<i>Lampsilis powelli</i>)	804020301 Alum Fork	Moderate	30.03	Moderate	Low	Moderate	Low	Low	Outcome 2
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 5
	804010104 South Fork Ouachita	High	66.43	Moderate	High	Moderate	Low		Outcome 4
	804020301 Alum Fork	High	30.03	Moderate	Low	Moderate	Low		Outcome 5
	804010101 Irons Fork	Moderate	37.90	Moderate	High	High	Low		Outcome 5
	804010103 Muddy Fiddler	Moderate	72.54	Moderate	Moderate	Low	Low		Outcome 5
	804010205 Caddo Headwaters	Moderate	64.12	Moderate	High	Low	Low		Outcome 5
	804010206 Carney Creek	Moderate	14.79	Moderate	Moderate	Moderate	Low		Outcome 5
	804020302 North Fork Saline	Moderate	23.07	Moderate	Low	High	Low		Outcome 5
	804020303 Middle Fork Saline	Moderate	12.17	High	Moderate	High	Low		Outcome 5

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Sandbank Pocketbook (<i>Lampsilis satura</i>)	804010106 Blakely	Low	48.49	Moderate	Low	Low	Low		Outcome 5
	1114010801 Twomile	High	40.16	Moderate	Moderate	Moderate	Low	Low	Outcome 4
	1114010901 Flat Creek	High	2.56	Moderate	Low	Moderate	Moderate		Outcome 5
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 4
	804010103 Muddy Fiddler	High	72.54	Moderate	Moderate	Low	Low		Outcome 4
	804010104 South Fork Ouachita	High	66.43	Moderate	High	Moderate	Low		Outcome 4
	804020301 Alum Fork	High	30.03	Moderate	Low	Moderate	Low		Outcome 4
	804020302 North Fork Saline	High	23.07	Moderate	Low	High	Low		Outcome 5
	804020303 Middle Fork Saline	High	12.17	High	Moderate	High	Low		Outcome 5
	804010106 Blakely	Low	48.49	Moderate	Low	Low	Low		Outcome 1
	1111010501 Poteau Headwaters	Critical	36.25	Moderate	High	High	Moderate	Low	Outcome 2
	1111010503 Middle Poteau	Critical	41.25	Moderate	High	Moderate	Low		Outcome 4
	1111020601 Cedar Creek	Critical	80.45	Low	Low	Low	Low		Outcome 4
	1114010801 Twomile	High	40.16	Moderate	Moderate	Moderate	Low		Outcome 4
	1114010901 Flat Creek	High	2.56	Moderate	Low	Moderate	Moderate		Outcome 5
Fatmucket (<i>Lampsilis siliquoidea</i>)									

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
	804010101 Irons Fork	High	37.90	Moderate	High	High	Low		Outcome 4
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 4
	804010104 South Fork Ouachita	High	66.43	Moderate	High	Moderate	Low		Outcome 4
	804010102 Kates Creek	Critical	44.79	Low	Moderate	Moderate	Low	Low	Outcome 1
	804010103 Muddy Fiddler	Critical	72.54	Moderate	Moderate	Low	Low		Outcome 1
	804010206 Carney Creek	Critical	14.79	Moderate	Moderate	Moderate	Low		Outcome 3
	1111020601 Cedar Creek	High	80.43	Low	Low	Low	Low		Outcome 1
	1111020602 Gafford Creek	High	63.49	Low	High	Low	Low		Outcome 1
	1114010704 Glover	High	16.82	Low	Low	Moderate	Low		Outcome 3
	1114010804 Beech	High	15.31	Low	Low	Moderate	Low		Outcome 3
	1114010805 Broken Bow Lake	High	29.32	Low	Moderate	Low	Low		Outcome 4
	1114010901 Flat Creek	High	2.56	Moderate	Low	Moderate	Moderate		Outcome 5
	804020301 Alum Fork	High	30.03	Moderate	Low	Moderate	Low		Outcome 4
Fluted Shell (<i>Lasmsgona costata</i>) continued	804020302 North Fork Saline	High	23.07	Moderate	Low	High	Low		Outcome 4
	804020303 Middle Fork Saline	High	12.17	High	Moderate	High	Low		Outcome 4

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Black Sandshell (<i>Ligumia recta</i>)	1111010503 Middle Poteau	Moderate	41.23	Moderate	High	Moderate	Low		Outcome 3
	1114010705 Lower Little River	Moderate	1.91	Moderate	Moderate	High	Moderate		Outcome 5
	804010106 Blakely	Low	48.49	Moderate	Low	Low	Low		Outcome 4
	1111020605 South Fork Fourche	Moderate	54.26	Low	Low	Low	Low	Low	Outcome 1
	1114010804 Beech	Moderate	15.31	Low	Low	Moderate	Low	Low	Outcome 3
	1111010505 Wister	High	33.47	Moderate	Moderate	Low	Low		Outcome 4
	1111010506 Riddle Creek	High	2.78	Moderate	High	High	High		Outcome 5
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 4
	804010106 Blakely	High	48.49	Moderate	Low	Low	Low		Outcome 4
	804010206 Carney Creek	High	14.79	Moderate	Moderate	Moderate	Low	Low	Outcome 5
	804020301 Alum Fork	High	30.03	Moderate	Low	Moderate	Low		Outcome 4
	804020302 North Fork Saline	High	23.07	Moderate	Low	High	Low		Outcome 5
	804020303 Middle Fork Saline	High	12.17	High	Moderate	High	Low		Outcome 5
	804010103 Muddy Fiddler	Moderate	72.54	Moderate	Moderate	Low	Low		Outcome 4

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Southern Hickorynut (<i>Obovaria jacksoniana</i>)	1111010503 Middle Poteau	Moderate	41.28	Moderate	High	Moderate	Low	Low	Outcome 4
	1111020601 Cedar Creek	Moderate	80.48	Low	Low	Low	Low		Outcome 4
	1114010501 Kiamichi Headwaters	Moderate	49.83	Low	Low	Low	Low		Outcome 4
	1114010704 Glover	Moderate	16.82	Low	Low	Moderate	Low		Outcome 5
	1114010705 Lower Little River	Moderate	1.91	Moderate	Moderate	High	Moderate		Outcome 5
	1114010804 Beech	Moderate	15.31	Low	Low	Moderate	Low		Outcome 5
	1114010805 Broken Bow Lake	Moderate	29.32	Low	Moderate	Low	Low		Outcome 4
	1114010901 Flat Creek	Moderate	2.56	Moderate	Low	Moderate	Moderate		Outcome 5
	804020301 Alum Fork	Moderate	30.03	Moderate	Low	Moderate	Low		Outcome 4
	804020302 North Fork Saline	Moderate	23.07	Moderate	Low	High	Low		Outcome 5
	1114010705 Lower Little River	High	1.91	Moderate	Moderate	High	Moderate	Moderate	Outcome 5
	804010103 Muddy Fiddler	Moderate	72.54	Moderate	Moderate	Low	Low		Outcome 2
Ohio Pigtoe (<i>Pleurobema cordatum</i>)	1111020403 Deadman Creek	High	25.09	Low	High	Moderate	High	Moderate	Outcome 3
	1114010901 Flat Creek	High	2.56	Moderate	Low	Moderate	Moderate		Outcome 1

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Ouachita Kidneyshell <i>(Ptychobranchus occidentalis)</i>	804010102 Kates Creek	Critical	44.79	Low	Moderate	Moderate	Low	Low	Outcome 1
	804010103 Muddy Fiddler	Critical	72.54	Moderate	Moderate	Low	Low		Outcome 1
	804020302 North Fork Saline	Critical	23.07	Moderate	Low	High	Low		Outcome 1
	1114010501 Kiamichi Headwaters	High	49.83	Low	Low	Low	Low		Outcome 1
	1114010704 Glover	High	16.82	Low	Low	Moderate	Low		Outcome 1
	804010206 Carney Creek	High	14.79	Moderate	Moderate	Moderate	Low		Outcome 1
	804020301 Alum Fork	High	30.03	Moderate	Low	Moderate	Low		Outcome 1
	804020303 Middle Fork Saline	High	12.17	High	Moderate	High	Low		Outcome 1
	1111020601 Cedar Creek	Moderate	80.46	Low	Low	Low	Low		Outcome 1
	1111020602 Gafford Creek	Moderate	63.51	Low	High	Low	Low		Outcome 1
	1114010705 Lower Little River	Moderate	1.91	Moderate	Moderate	High	Moderate		Outcome 3
	1114010801 Twomile	Moderate	40.16	Moderate	Moderate	Moderate	Low		Outcome 1
	1114010804 Beech	Moderate	15.31	Low	Low	Moderate	Low		Outcome 1
	1114010805 Broken Bow Lake	Moderate	29.32	Low	Moderate	Low	Low		Outcome 1
	1114010901 Flat Creek	Moderate	2.56	Moderate	Low	Moderate	Moderate		Outcome 3
	1114010907 Shady Lake	Moderate	7.14	Moderate	High	Low	Low		Outcome 1

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
	804010104 South Fork Ouachita	Moderate	66.43	Moderate	High	Moderate	Low		Outcome 1
	804010106 Blakely	Moderate	48.49	Moderate	Low	Low	Low		Outcome 1
	804010207 South Fork Caddo	Moderate	48.97	High	Low	Moderate	Low		Outcome 1
Rabbitsfoot (<i>Quadrula cylindrica cylindrica</i>)	804010103 Muddy Fiddler	High	72.54	Moderate	Moderate	Low	Low	Low	Outcome 1
	1114010705 Lower Little River	High	1.91	Moderate	Moderate	High	Moderate		Outcome 3
Monkeyface (<i>Quadrula metanevra</i>)	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 1
	804010103 Muddy Fiddler	High	72.54	Moderate	Moderate	Low	Low		Outcome 1
	1114010501 Kiamichi Headwaters	Moderate	49.83	Low	Low	Low	Low		Outcome 1
Monkeyface (<i>Quadrula metanevra</i>) continued	804010104 South Fork Ouachita	Moderate	66.43	Moderate	High	Moderate	Low	Low	Outcome 1
	804010106 Blakely	Low	48.49	Moderate	Low	Low	Low		Outcome 1
Purple Lilliput (<i>Toxolasma lividus</i>)	1111010501 Poteau Headwaters	High	36.28	Moderate	High	High	Moderate		Outcome 3
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 1
	804020302 North Fork Saline	High	23.07	Moderate	Low	High	Low		Outcome 1

<i>Scientific Name</i>	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
Ouachita Creekshell (<i>Villosa arkansasensis</i>)	1111010503 Middle Poteau	Moderate	41.27	Moderate	High	Moderate	Low		Outcome 1
	1114010801 Twomile	Moderate	40.16	Moderate	Moderate	Moderate	Low		Outcome 1
	804020301 Alum Fork	Moderate	30.03	Moderate	Low	Moderate	Low		Outcome 1
	804020301 Alum Fork	Critical	30.03	Moderate	Low	Moderate	Low	Low	Outcome 1
	804020302 North Fork Saline	Critical	23.07	Moderate	Low	High	Low		Outcome 1
	804020303 Middle Fork Saline	Critical	12.17	High	Moderate	High	Low		Outcome 1
	1111020602 Gafford Creek	High	63.52	Low	High	Low	Low		Outcome 1
	1114010704 Glover	High	16.82	Low	Low	Moderate	Low		Outcome 1
	1114010705 Lower Little River	High	1.91	Moderate	Moderate	High	Moderate		Outcome 3
	804010102 Kates Creek	High	44.79	Low	Moderate	Moderate	Low		Outcome 1
	804010103 Muddy Fiddler	High	72.54	Moderate	Moderate	Low	Low		Outcome 1
	804010104 South Fork Ouachita	High	66.43	Moderate	High	Moderate	Low		Outcome 1
	1111010503 Middle Poteau	Moderate	41.29	Moderate	High	Moderate	Low		Outcome 1
	1111020601 Cedar Creek	Moderate	80.49	Low	Low	Low	Low		Outcome 1
	1114010501 Kiamichi Headwaters	Moderate	49.83	Low	Low	Low	Low		Outcome 1
	1114010801 Twomile	Moderate	40.16	Moderate	Moderate	Moderate	Low		Outcome 1
Ouachita Creekshell (<i>Villosa arkansasensis</i>) continued									

Scientific Name	5th Level Hydrologic Unit/Watershed	HUC Importance to Species	Percent Forest Service Ownership	Risk from Point Source	Risk from Riparian Health	Risk from Hydrological Modification	Risk from Predicted Increased Sediment	Current Risk to Species Viability	NFS Ownership Importance
	1114010804 Beech	Moderate	15.31	Low	Low	Moderate	Low		Outcome 1
	1114010805 Broken Bow Lake	Moderate	29.32	Low	Moderate	Low	Low		Outcome 1
	804010101 Irons Fork	Moderate	37.90	Moderate	High	High	Low		Outcome 1
	804010206 Carney Creek	Moderate	14.79	Moderate	Moderate	Moderate	Low		Outcome 1
Rainbow (<i>Villosa iris</i>)	1114010501 Kiamichi Headwaters	High	49.83	Low	Low	Low	Low	Low	Outcome 1
	1114010704 Glover	High	16.82	Low	Low	Moderate	Low		Outcome 1
	1114010705 Lower Little River	High	1.91	Moderate	Moderate	High	Moderate		Outcome 3
	1114010804 Beech	High	15.31	Low	Low	Moderate	Low		Outcome 1
	1114010805 Broken Bow Lake	High	29.32	Low	Moderate	Low	Low		Outcome 1
	804010104 South Fork Ouachita	High	66.43	Moderate	High	Moderate	Low		Outcome 1

Table E.2 Ouachita National Forest Terrestrial Communities and Habitat Elements with an Associated Species List (Weighted Viability Scores reflect Current SVE Score and Condition).

Conservation Target Name: Caves, Mines & Karst Habitat

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 4 - Very Good

<i>Lirceus bicuspidatus</i>	An Isopod		
Weighted Viability Score:	2.9 - Good	Weight:	Optimal
<i>Myotis austroriparius</i>	Southeastern Myotis		
Weighted Viability Score:	3.36 - Very Good	Weight:	Obligate
<i>Myotis leibii</i>	Eastern Small-Footed Bat		
Weighted Viability Score:	3.31 - Very Good	Weight:	Obligate
<i>Myotis sodalis</i>	Indiana Bat		
Weighted Viability Score:	2.86 - Good	Weight:	Obligate

Conservation Target Name: Central Interior Acidic Cliff and Talus

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 2 - Fair

<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Vireo griseus</i>	White-eyed Vireo		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Speyeria diana</i>	Diana		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Stenotrema pilsbryi</i>	Rich Mountain Slitmouth		
Weighted Viability Score:	2 - Fair	Weight:	Obligate
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Conservation Target Name: Central Interior Highlands Dry Acidic Glade and Barrens

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score

1.33 – Poor

<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Vireo griseus</i>	White-eyed Vireo		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Speyeria diana</i>	Diana		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Carex latebracteata</i>	Waterfall's Sedge		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Draba aprica</i>	Open-ground Whitlow-grass		
Weighted Viability Score:	2 – Fair	Weight:	Obligate
<i>Eleocharis wolfii</i>	Wolf Spikerush		
Weighted Viability Score:	2.67 - Good	Weight:	Obligate
<i>Eriocaulon kornickianum</i>	Small-headed Pipewort		
Weighted Viability Score:	2.67 - Good	Weight:	Obligate
<i>Helianthus occidentalis</i> ssp <i>plantagineus</i>	Shinners' Sunflower		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Quercus acerifolia</i>	Maple-leaved Oak		
Weighted Viability Score:	2 - Fair	Weight:	Suitable
<i>Valerianella nuttallii</i>	Nuttall's Corn-Salad		
Weighted Viability Score:	2 - Fair	Weight:	Obligate
<i>Valerianella palmeri</i>	A Corn-Salad		
Weighted Viability Score:	2.62 - Good	Weight:	Optimal
<i>Crotalus atrox</i>	Western Diamondback Rattlesnake		
Weighted Viability Score:	2.4 - Fair	Weight:	Suitable
<i>Crotaphytus collaris</i>	Collared Lizard		

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score

<i>Hyla avivoca</i>	Bird-voiced Tree Frog		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Caprimulgus vociferus</i>	Whip-poor-will		
Weighted Viability Score:	2.48 - Fair	Weight:	Marginal
<i>Chaetura pelagica</i>	Chimney Swift		
Weighted Viability Score:	2.71 - Good	Weight:	Optimal
<i>Dendroica cerulea</i>	Cerulean Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Empidonax virescens</i>	Acadian Flycatcher		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Haliaeetus leucocephalus</i>	Bald Eagle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Hylocichla mustelina</i>	Wood Thrush		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Icterus spurius</i>	Orchard Oriole		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Limnothlypis swainsonii</i>	Swainson's Warbler		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		
Weighted Viability Score:	2.82 - Good	Weight:	Optimal

<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Optimal
<i>Oporornis formosus</i>	Kentucky Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Piranga olivacea</i>	Scarlet Tanager		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Protonotaria citrea</i>	Prothonotary Warbler		
Weighted Viability Score:	2.88 - Good	Weight:	Optimal
<i>Vireo flavifrons</i>	Yellow-throated Vireo		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Vireo griseus</i>	White-eyed Vireo		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Wilsonia citrina</i>	Hooded Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Conservation Target Name: Forested-Dense or Semi-open Pine Guild Habitat

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 2.18 - Fair

<i>Aimophila aestivalis</i>	Bachman's Sparrow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Dendroica discolor</i>	Prairie Warbler		
Weighted Viability Score:	2.31 - Fair	Weight:	Suitable
<i>Dryocopus pileatus</i>	Pileated Woodpecker		

Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Falco sparverius</i>	American Kestrel		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Haliaeetus leucocephalus</i>	Bald Eagle		
Weighted Viability Score:	2.75 - Good	Weight:	Suitable
<i>Helmitheros vermivorus</i>	Worm-eating Warbler		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Hylocichla mustelina</i>	Wood Thrush		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Oporornis formosus</i>	Kentucky Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Sitta pusilla</i>	Brown-headed Nuthatch		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Vireo griseus</i>	White-eyed Vireo		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Wilsonia citrina</i>	Hooded Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Marginal
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Conservation Target Name: Forested-Dry Upland Hardwood & Hardwood/Pine Guild Habitat

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 2.15 - Fair

Caprimulgus carolinensis Chuck-will's-widow

Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Caprimulgus vociferus</i>	Whip-poor-will		
Weighted Viability Score:	2.48 - Fair	Weight:	Optimal
<i>Chaetura pelagica</i>	Chimney Swift		
Weighted Viability Score:	2.71 - Good	Weight:	Suitable
<i>Dendroica discolor</i>	Prairie Warbler		
Weighted Viability Score:	2.31 - Fair	Weight:	Suitable
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Helmitheros vermivorus</i>	Worm-eating Warbler		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Piranga olivacea</i>	Scarlet Tanager		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Vireo griseus</i>	White-eyed Vireo		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Conservation Target Name: **Grass/Forb Guild Habitat**

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 1.56 - Poor

<i>Colinus virginianus</i>	Northern Bobwhite		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Dendroica discolor</i>	Prairie Warbler		
Weighted Viability Score:	2.31 - Fair	Weight:	Obligate

<i>Falco sparverius</i>	American Kestrel		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Optimal
<i>Vireo griseus</i>	White-eyed Vireo		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Nicrophorus americanus</i>	American Burying Beetle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Speyeria diana</i>	Diana		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Streptanthus squamiformis</i>	A Twistflower		
Weighted Viability Score:	2.21 - Fair	Weight:	Obligate
<i>Crotalus atrox</i>	Western Diamondback Rattlesnake		
Weighted Viability Score:	2.4 - Fair	Weight:	Suitable
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Eumeces obsoletus</i>	Great Plains Skink		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Eumeces septentrionalis obtusirostris</i>	Southern Prairie Skink		
Weighted Viability Score:	2.29 - Fair	Weight:	Optimal

Conservation Target Name: Large Diameter Hollow Trees

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 4 - Very Good

<i>Chaetura pelagica</i>	Chimney Swift		
Weighted Viability Score:	2.71 - Good	Weight:	Obligate
<i>Dryocopus pileatus</i>	Pileated Woodpecker		

Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		
Weighted Viability Score:	2.82 - Good	Weight:	Optimal
<i>Protonotaria citrea</i>	Prothonotary Warbler		
Weighted Viability Score:	2.88 - Good	Weight:	Obligate
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-Eared Bat		
Weighted Viability Score:	4 - Very Good	Weight:	Optimal
<i>Myotis austroriparius</i>	Southeastern Myotis		
Weighted Viability Score:	3.36 - Very Good	Weight:	Optimal
<i>Myotis sodalis</i>	Indiana Bat		
Weighted Viability Score:	2.86 - Good	Weight:	Optimal

Conservation Target Name: Large Trees near Water

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 4 - Very Good

<i>Dendroica cerulea</i>	Cerulean Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Haliaeetus leucocephalus</i>	Bald Eagle		
Weighted Viability Score:	2.75 - Good	Weight:	Obligate
<i>Myotis austroriparius</i>	Southeastern Myotis		
Weighted Viability Score:	3.36 - Very Good	Weight:	Optimal
<i>Myotis sodalis</i>	Indiana Bat		
Weighted Viability Score:	2.86 - Good	Weight:	Optimal

Conservation Target Name: Oak Woodlands Guild Habitat

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 2.22 - Fair

<i>Aimophila aestivalis</i>	Bachman's Sparrow		
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Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Colinus virginianus</i>	Northern Bobwhite		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Dendroica discolor</i>	Prairie Warbler		
Weighted Viability Score:	2.31 - Fair	Weight:	Optimal
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Falco sparverius</i>	American Kestrel		
Weighted Viability Score:	2.75 - Good	Weight:	Suitable
<i>Icterus spurius</i>	Orchard Oriole		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		
Weighted Viability Score:	2.82 - Good	Weight:	Optimal
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Optimal
<i>Passerina ciris</i>	Painted Bunting		
Weighted Viability Score:	2.56 - Good	Weight:	Suitable
<i>Piranga olivacea</i>	Scarlet Tanager		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Thryomanes bewickii</i>	Bewick's Wren		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Spilogale putorius interrupta</i>	Plains Spotted Skunk		
Weighted Viability Score:	2.55 - Good	Weight:	Suitable
<i>Callirhoe bushii</i>	Bush's Poppymallow		
Weighted Viability Score:	2.67 - Good	Weight:	Suitable
<i>Crotalus atrox</i>	Western Diamondback Rattlesnake		

Weighted Viability Score:	2.4 - Fair	Weight:	Suitable
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal

Conservation Target Name: Ouachita Dry Oak Woodland

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 1.17 - Poor

<i>Aimophila aestivalis</i>	Bachman's Sparrow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Caprimulgus vociferus</i>	Whip-poor-will		
Weighted Viability Score:	2.48 - Fair	Weight:	Suitable
<i>Colinus virginianus</i>	Northern Bobwhite		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Dendroica discolor</i>	Prairie Warbler		
Weighted Viability Score:	2.31 - Fair	Weight:	Optimal
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Falco sparverius</i>	American Kestrel		
Weighted Viability Score:	2.75 - Good	Weight:	Suitable
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		
Weighted Viability Score:	2.82 - Good	Weight:	Suitable
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Optimal
<i>Piranga olivacea</i>	Scarlet Tanager		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Thryomanes bewickii</i>	Bewick's Wren		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal

<i>Nicrophorus americanus</i>	American Burying Beetle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Myotis leibii</i>	Eastern Small-Footed Bat		
Weighted Viability Score:	3.31 - Very Good	Weight:	Suitable
<i>Myotis sodalis</i>	Indiana Bat		
Weighted Viability Score:	2.86 - Good	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Spilogale putorius interrupta</i>	Plains Spotted Skunk		
Weighted Viability Score:	2.55 - Good	Weight:	Suitable
<i>Callirhoe bushii</i>	Bush's Poppymallow		
Weighted Viability Score:	2.67 - Good	Weight:	Suitable
<i>Castanea pumila</i> var <i>ozarkensis</i>	Ozark Chinquapin		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Trillium pusillum</i> var <i>ozarkanum</i>	Ozark Least Trillium		
Weighted Viability Score:	2.47 - Fair	Weight:	Marginal
<i>Crotalus atrox</i>	Western Diamondback Rattlesnake		
Weighted Viability Score:	2.4 - Fair	Weight:	Marginal
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Eumeces obsoletus</i>	Great Plains Skink		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Eumeces septentrionalis obtusirostris</i>	Southern Prairie Skink		
Weighted Viability Score:	2.29 - Fair	Weight:	Optimal

Conservation Target Name: **Ouachita Dry-Mesic Oak Forest**

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score: 1.64 - Poor

Ambystoma talpoideum Mole Salamander

Weighted Viability Score:	2.86 - Good	Weight:	Suitable
<i>Plethodon caddoensis</i>	Caddo Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Plethodon fourchensis</i>	Fourche Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Plethodon kiamichi</i>	Kiamichi Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Plethodon sequoyah</i>	Sequoyah Slimy Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Plethodon serratus</i>	Southern Redback Salamander		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Caprimulgus vociferus</i>	Whip-poor-will		
Weighted Viability Score:	2.48 - Fair	Weight:	Suitable
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Helmitheros vermivorus</i>	Worm-eating Warbler		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Hylocichla mustelina</i>	Wood Thrush		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Oporornis formosus</i>	Kentucky Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Piranga olivacea</i>	Scarlet Tanager		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Vireo griseus</i>	White-eyed Vireo		

Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Wilsonia citrina</i>	Hooded Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Nicrophorus americanus</i>	American Burying Beetle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Speyeria diana</i>	Diana		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Myotis sodalis</i>	Indiana Bat		
Weighted Viability Score:	2.86 - Good	Weight:	Suitable
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Spilogale putorius interrupta</i>	Plains Spotted Skunk		
Weighted Viability Score:	2.55 - Good	Weight:	Suitable
<i>Castanea pumila</i> var <i>ozarkensis</i>	Ozark Chinquapin		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Solidago ouachitensis</i>	A Goldenrod		
Weighted Viability Score:	2.53 - Good	Weight:	Suitable
<i>Streptanthus squamiformis</i>	A Twistflower		
Weighted Viability Score:	2.21 - Fair	Weight:	Suitable
<i>Trillium pusillum</i> var <i>ozarkanum</i>	Ozark Least Trillium		
Weighted Viability Score:	2.47 - Fair	Weight:	Suitable
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Eumeces obsoletus</i>	Great Plains Skink		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Eumeces septentrionalis obtusirostris</i>	Southern Prairie Skink		
Weighted Viability Score:	2.29 - Fair	Weight:	Suitable

Conservation Target Name: Ouachita Mesic Hardwood Forest and Guild Habitat
Umbrella Status: Covered by Habitat Conservation Target
Weighted Viability Score: 2.5 - Fair

<i>Ambystoma annulatum</i>	Ringed Salamander		
Weighted Viability Score:	2.94 - Good	Weight:	Optimal
<i>Ambystoma talpoideum</i>	Mole Salamander		
Weighted Viability Score:	2.86 - Good	Weight:	Optimal
<i>Hemidactylium scutatum</i>	Four-toed Salamander		
Weighted Viability Score:	2.55 - Good	Weight:	Marginal
<i>Plethodon caddoensis</i>	Caddo Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Optimal
<i>Plethodon fourchensis</i>	Fourche Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Optimal
<i>Plethodon kiamichi</i>	Kiamichi Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Optimal
<i>Plethodon ouachitae</i>	Rich Mountain Salamander		
Weighted Viability Score:	2.67 - Good	Weight:	Optimal
<i>Plethodon sequoyah</i>	Sequoyah Slimy Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Optimal
<i>Plethodon serratus</i>	Southern Redback Salamander		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Caprimulgus vociferus</i>	Whip-poor-will		
Weighted Viability Score:	2.48 - Fair	Weight:	Optimal
<i>Chaetura pelagica</i>	Chimney Swift		
Weighted Viability Score:	2.71 - Good	Weight:	Suitable
<i>Dendroica cerulea</i>	Cerulean Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal

<i>Dendroica discolor</i>	Prairie Warbler		
Weighted Viability Score:	2.31 - Fair	Weight:	Suitable
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Empidonax virescens</i>	Acadian Flycatcher		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Helminthos vermivorus</i>	Worm-eating Warbler		
Weighted Viability Score:	2.59 - Good	Weight:	Optimal
<i>Hylocichla mustelina</i>	Wood Thrush		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Limnothlypis swainsonii</i>	Swainson's Warbler		
Weighted Viability Score:	2.56 - Good	Weight:	Suitable
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Oporornis formosus</i>	Kentucky Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Piranga olivacea</i>	Scarlet Tanager		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Vireo flavifrons</i>	Yellow-throated Vireo		
Weighted Viability Score:	2.56 - Good	Weight:	Suitable
<i>Wilsonia citrina</i>	Hooded Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Nicrophorus americanus</i>	American Burying Beetle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Speyeria diana</i>	Diana		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Stenotrema unciferum</i>	Ouachita Slitmouth		
Weighted Viability Score:	2.67 - Good	Weight:	Obligate

<i>Myotis leibii</i>	Eastern Small-Footed Bat		
Weighted Viability Score:	3.31 - Very Good	Weight:	Suitable
<i>Myotis sodalis</i>	Indiana Bat		
Weighted Viability Score:	2.86 - Good	Weight:	Suitable
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Spilogale putorius interrupta</i>	Plains Spotted Skunk		
Weighted Viability Score:	2.55 - Good	Weight:	Marginal
<i>Amorpha ouachitensis</i>	Ouachita Leadplant		
Weighted Viability Score:	2.5 - Fair	Weight:	Marginal
<i>Carex latebracteata</i>	Waterfall's Sedge		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Castanea pumila</i> var <i>ozarkensis</i>	Ozark Chinquapin		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Delphinium newtonianum</i>	Moore's Larkspur		
Weighted Viability Score:	3.08 - Good	Weight:	Optimal
<i>Houstonia ouachitana</i>	Ouachita Bluet		
Weighted Viability Score:	2.67 - Good	Weight:	Suitable
<i>Hydrophyllum brownei</i>	Browne's Waterleaf		
Weighted Viability Score:	2.58 - Good	Weight:	Suitable
<i>Juglans cinerea</i>	Butternut		
Weighted Viability Score:	2.67 - Good	Weight:	Suitable
<i>Solidago ouachitensis</i>	A Goldenrod		
Weighted Viability Score:	2.53 - Good	Weight:	Optimal
<i>Tradescantia ozarkana</i>	Ozark Spiderwort		
Weighted Viability Score:	2.67 - Good	Weight:	Optimal
<i>Trillium pusillum</i> var <i>ozarkanum</i>	Ozark Least Trillium		
Weighted Viability Score:	2.47 - Fair	Weight:	Optimal

<i>Valerianella palmeri</i>	A Corn-Salad		
Weighted Viability Score:	2.62 - Good	Weight:	Marginal
<i>Verbesina walteri</i>	Rayless Crown-Beard		
Weighted Viability Score:	2.67 - Good	Weight:	Marginal

Conservation Target Name: **Ouachita Montane Oak Forest**
Umbrella Status: Covered by Habitat Conservation Target
Weighted Viability Score 2 - Fair

<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Piranga olivacea</i>	Scarlet Tanager		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Crotalus atrox</i>	Western Diamondback Rattlesnake		
Weighted Viability Score:	2.4 - Fair	Weight:	Suitable
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Conservation Target Name: **Ouachita Mountain Forested Seep**
Umbrella Status: Covered by Habitat Conservation Target
Weighted Viability Score 2.5 - Fair

<i>Ambystoma annulatum</i>	Ringed Salamander		
Weighted Viability Score:	2.94 - Good	Weight:	Suitable
<i>Ambystoma talpoideum</i>	Mole Salamander		
Weighted Viability Score:	2.86 - Good	Weight:	Suitable
<i>Desmognathus brimleyorum</i>	Ouachita Dusky Salamander		
Weighted Viability Score:	2.67 - Good	Weight:	Optimal

<i>Eurycea multiplicata multiplicata</i>	Many-ribbed Salamander		
Weighted Viability Score:	3.1 - Good	Weight:	Suitable
<i>Hemidactylium scutatum</i>	Four-toed Salamander		
Weighted Viability Score:	2.55 - Good	Weight:	Obligate
<i>Plethodon ouachitae</i>	Rich Mountain Salamander		
Weighted Viability Score:	2.67 - Good	Weight:	Optimal
<i>Plethodon sequoyah</i>	Sequoyah Slimy Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Lirceus bicuspidatus</i>	An Isopod		
Weighted Viability Score:	2.9 - Good	Weight:	Optimal
<i>Cypripedium kentuckiense</i>	Southern Lady's-Slipper		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Dryopteris x australis</i>	Dryopteris		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-Parnassus		
Weighted Viability Score:	2.5 - Fair	Weight:	Obligate
<i>Valerianella palmeri</i>	A Corn-Salad		
Weighted Viability Score:	2.62 - Good	Weight:	Suitable

Conservation Target Name: Ouachita Novaculite Glade and Woodland

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 2.5 - Fair

<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Speyeria diana</i>	Diana		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Carex latebracteata</i>	Waterfall's Sedge		

Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Polymnia cossatotensis</i>	Heartleaf Leafcup		
Weighted Viability Score:	2.5 - Fair	Weight:	Obligate
<i>Streptanthus squamiformis</i>	A Twistflower		
Weighted Viability Score:	2.21 - Fair	Weight:	Optimal
<i>Crotalus atrox</i>	Western Diamondback Rattlesnake		
Weighted Viability Score:	2.4 - Fair	Weight:	Suitable
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Conservation Target Name: Ouachita Pine/Bluestem Woodland and Guild Habitat

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 2.61 - Good

<i>Aimophila aestivalis</i>	Bachman's Sparrow		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Falco sparverius</i>	American Kestrel		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		
Weighted Viability Score:	2.82 - Good	Weight:	Optimal
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Optimal
<i>Picoides borealis</i>	Red-cockaded Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Sitta pusilla</i>	Brown-headed Nuthatch		
Weighted Viability Score:	2.5 - Fair	Weight:	Obligate
<i>Nicrophorus americanus</i>	American Burying Beetle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal

<i>Speyeria diana</i>	Diana		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Crotalus atrox</i>	Western Diamondback Rattlesnake		
Weighted Viability Score:	2.4 - Fair	Weight:	Suitable
<i>Eumeces obsoletus</i>	Great Plains Skink		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Eumeces septentrionalis obtusirostris</i>	Southern Prairie Skink		
Weighted Viability Score:	2.29 - Fair	Weight:	Suitable

Conservation Target Name: Ouachita Pine-Oak Forest

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 2.06 - Fair

<i>Ambystoma talpoideum</i>	Mole Salamander		
Weighted Viability Score:	2.86 - Good	Weight:	Suitable
<i>Plethodon caddoensis</i>	Caddo Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Plethodon fourchensis</i>	Fourche Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Plethodon kiamichi</i>	Kiamichi Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Plethodon sequoyah</i>	Sequoyah Slimy Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Plethodon serratus</i>	Southern Redback Salamander		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Aimophila aestivalis</i>	Bachman's Sparrow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow		

Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Caprimulgus vociferus</i>	Whip-poor-will		
Weighted Viability Score:	2.48 - Fair	Weight:	Optimal
<i>Colinus virginianus</i>	Northern Bobwhite		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Dendroica discolor</i>	Prairie Warbler		
Weighted Viability Score:	2.31 - Fair	Weight:	Optimal
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Falco sparverius</i>	American Kestrel		
Weighted Viability Score:	2.75 - Good	Weight:	Suitable
<i>Haliaeetus leucocephalus</i>	Bald Eagle		
Weighted Viability Score:	2.75 - Good	Weight:	Suitable
<i>Helmitheros vermivorus</i>	Worm-eating Warbler		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		
Weighted Viability Score:	2.82 - Good	Weight:	Optimal
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Oporornis formosus</i>	Kentucky Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Piranga olivacea</i>	Scarlet Tanager		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Sitta pusilla</i>	Brown-headed Nuthatch		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Thryomanes bewickii</i>	Bewick's Wren		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Vireo griseus</i>	White-eyed Vireo		

Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Wilsonia citrina</i>	Hooded Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Nicrophorus americanus</i>	American Burying Beetle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Speyeria diana</i>	Diana		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Spilogale putorius interrupta</i>	Plains Spotted Skunk		
Weighted Viability Score:	2.55 - Good	Weight:	Suitable
<i>Amorpha ouachitensis</i>	Ouachita Leadplant		
Weighted Viability Score:	2.5 - Fair	Weight:	Marginal
<i>Carex latebracteata</i>	Waterfall's Sedge		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Castanea pumila</i> var <i>ozarkensis</i>	Ozark Chinquapin		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Helianthus occidentalis</i> ssp <i>plantagineus</i>	Shinnery's Sunflower		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Eumeces septentrionalis obtusirostris</i>	Southern Prairie Skink		
Weighted Viability Score:	2.29 - Fair	Weight:	Marginal

Conservation Target Name: Ouachita Pine-Oak Woodland

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 2.11 - Fair

<i>Aimophila aestivalis</i>	Bachman's Sparrow		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal

<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Optimal
<i>Picoides borealis</i>	Red-cockaded Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Piranga olivacea</i>	Scarlet Tanager		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Crotalus atrox</i>	Western Diamondback Rattlesnake		
Weighted Viability Score:	2.4 - Fair	Weight:	Suitable
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Eumeces obsoletus</i>	Great Plains Skink		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Eumeces septentrionalis obtusirostris</i>	Southern Prairie Skink		
Weighted Viability Score:	2.29 - Fair	Weight:	Suitable

Conservation Target Name: Ouachita Ponds, Lakes and Water Holes

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 4 - Very Good

<i>Ambystoma annulatum</i>	Ringed Salamander		
Weighted Viability Score:	2.94 - Good	Weight:	Obligate
<i>Ambystoma talpoideum</i>	Mole Salamander		
Weighted Viability Score:	2.86 - Good	Weight:	Obligate
<i>Hyla avivoca</i>	Bird-voiced Tree Frog		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Pseudacris streckeri streckeri</i>	Strecker's Chorus Frog		

Weighted Viability Score:	3.42 - Very Good	Weight:	Optimal
<i>Rana areolata circumlosa</i>	Northern Crawfish Frog		
Weighted Viability Score:	3.48 - Very Good	Weight:	Optimal
<i>Haliaeetus leucocephalus</i>	Bald Eagle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Myotis austroriparius</i>	Southeastern Myotis		
Weighted Viability Score:	3.36 - Very Good	Weight:	Optimal
<i>Myotis leibii</i>	Eastern Small-Footed Bat		
Weighted Viability Score:	3.31 - Very Good	Weight:	Optimal
<i>Myotis sodalis</i>	Indiana Bat		
Weighted Viability Score:	2.86 - Good	Weight:	Optimal

Conservation Target Name: Ouachita Riparian

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 2.5 - Fair

<i>Ambystoma annulatum</i>	Ringed Salamander		
Weighted Viability Score:	2.94 - Good	Weight:	Suitable
<i>Ambystoma talpoideum</i>	Mole Salamander		
Weighted Viability Score:	2.86 - Good	Weight:	Suitable
<i>Plethodon caddoensis</i>	Caddo Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Plethodon fourchensis</i>	Fourche Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable
<i>Plethodon kiamichi</i>	Kiamichi Mountain Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Optimal
<i>Plethodon ouachitae</i>	Rich Mountain Salamander		
Weighted Viability Score:	2.67 - Good	Weight:	Optimal
<i>Plethodon sequoyah</i>	Sequoyah Slimy Salamander		
Weighted Viability Score:	2.59 - Good	Weight:	Suitable

<i>Plethodon serratus</i>	Southern Redback Salamander		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Pseudacris streckeri streckeri</i>	Strecker's Chorus Frog		
Weighted Viability Score:	3.42 - Very Good	Weight:	Suitable
<i>Rana areolata circulosa</i>	Northern Crawfish Frog		
Weighted Viability Score:	3.48 - Very Good	Weight:	Marginal
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Chaetura pelagica</i>	Chimney Swift		
Weighted Viability Score:	2.71 - Good	Weight:	Suitable
<i>Dendroica cerulea</i>	Cerulean Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Empidonax virescens</i>	Acadian Flycatcher		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Helmitheros vermivorus</i>	Worm-eating Warbler		
Weighted Viability Score:	2.59 - Good	Weight:	Optimal
<i>Hylocichla mustelina</i>	Wood Thrush		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		
Weighted Viability Score:	2.82 - Good	Weight:	Suitable
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Oporornis formosus</i>	Kentucky Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Passerina ciris</i>	Painted Bunting		

Weighted Viability Score:	2.56 - Good	Weight:	Suitable
<i>Vireo flavifrons</i>	Yellow-throated Vireo		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Wilsonia citrina</i>	Hooded Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Speyeria diana</i>	Diana		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Myotis austroriparius</i>	Southeastern Myotis		
Weighted Viability Score:	3.36 - Very Good	Weight:	Suitable
<i>Myotis sodalis</i>	Indiana Bat		
Weighted Viability Score:	2.86 - Good	Weight:	Suitable
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Amorpha ouachitensis</i>	Ouachita Leadplant		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Carex latebracteata</i>	Waterfall's Sedge		
Weighted Viability Score:	2.5 - Fair	Weight:	Marginal
<i>Cypripedium kentuckiense</i>	Southern Lady's-Slipper		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Delphinium newtonianum</i>	Moore's Larkspur		
Weighted Viability Score:	3.08 - Good	Weight:	Optimal
<i>Dryopteris x australis</i>	Dryopteris		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Houstonia ouachitana</i>	Ouachita Bluet		
Weighted Viability Score:	2.67 - Good	Weight:	Suitable
<i>Hydrophyllum brownei</i>	Browne's Waterleaf		
Weighted Viability Score:	2.58 - Good	Weight:	Optimal
<i>Juglans cinerea</i>	Butternut		

Weighted Viability Score:	2.67 - Good	Weight:	Suitable
<i>Tradescantia ozarkana</i>	Ozark Spiderwort		
Weighted Viability Score:	2.67 - Good	Weight:	Optimal
<i>Trillium pusillum</i> var <i>ozarkanum</i>	Ozark Least Trillium		
Weighted Viability Score:	2.47 - Fair	Weight:	Optimal
<i>Valerianella palmeri</i>	A Corn-Salad		
Weighted Viability Score:	2.62 - Good	Weight:	Optimal
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Conservation Target Name: Ouachita Rivers and Streams

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 3.5 - Very Good

<i>Desmognathus brimeylorum</i>	Ouachita Dusky Salamander		
Weighted Viability Score:	2.67 - Good	Weight:	Optimal
<i>Eurycea multiplicata multiplicata</i>	Many-ribbed Salamander		
Weighted Viability Score:	3.1 - Good	Weight:	Optimal
<i>Hyla avivoca</i>	Bird-voiced Tree Frog		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Haliaeetus leucocephalus</i>	Bald Eagle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Lirceus bicuspidatus</i>	An Isopod		
Weighted Viability Score:	2.9 - Good	Weight:	Suitable
<i>Myotis austroriparius</i>	Southeastern Myotis		
Weighted Viability Score:	3.36 - Very Good	Weight:	Optimal
<i>Myotis leibii</i>	Eastern Small-Footed Bat		
Weighted Viability Score:	3.31 - Very Good	Weight:	Optimal
<i>Myotis sodalis</i>	Indiana Bat		
Weighted Viability Score:	2.86 - Good	Weight:	Optimal

<i>Calamovilfa arcuata</i>	A Sandgrass		
Weighted Viability Score:	3.5 - Very Good	Weight:	Obligate
<i>Helianthus occidentalis</i> ssp <i>plantagineus</i>	Shinners' Sunflower		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Vernonia lettermannii</i>	Narrowleaf Ironweed		
Weighted Viability Score:	3.5 - Very Good	Weight:	Obligate
<i>Vitis rupestris</i>	Sand Grape		
Weighted Viability Score:	3.5 - Very Good	Weight:	Obligate
<i>Sternotherus carinatus</i>	Razorback Musk Turtle		
Weighted Viability Score:	3.5 - Very Good	Weight:	Obligate

Conservation Target Name: Shrubland Guild Habitat

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 2.07 - Fair

<i>Colinus virginianus</i>	Northern Bobwhite		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Dendroica discolor</i>	Prairie Warbler		
Weighted Viability Score:	2.31 - Fair	Weight:	Optimal
<i>Falco sparverius</i>	American Kestrel		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Icterus spurius</i>	Orchard Oriole		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Passerina ciris</i>	Painted Bunting		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Thryomanes bewickii</i>	Bewick's Wren		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Vireo griseus</i>	White-eyed Vireo		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Nicrophorus americanus</i>	American Burying Beetle		

Weighted Viability Score:	2.75 - Good	Weight:	Suitable
<i>Speyeria diana</i>	Diana		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Crotalus atrox</i>	Western Diamondback Rattlesnake		
Weighted Viability Score:	2.4 - Fair	Weight:	Suitable
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Conservation Target Name: Snags

Umbrella Status: Covered by Habitat Conservation Target
Weighted Viability Score 4 - Very Good

<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Falco sparverius</i>	American Kestrel		
Weighted Viability Score:	2.75 - Good	Weight:	Obligate
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		
Weighted Viability Score:	2.82 - Good	Weight:	Obligate
<i>Protonotaria citrea</i>	Prothonotary Warbler		
Weighted Viability Score:	2.88 - Good	Weight:	Obligate
<i>Sitta pusilla</i>	Brown-headed Nuthatch		
Weighted Viability Score:	2.5 - Fair	Weight:	Obligate
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-Eared Bat		
Weighted Viability Score:	4 - Very Good	Weight:	Suitable
<i>Myotis austroriparius</i>	Southeastern Myotis		
Weighted Viability Score:	3.36 - Very Good	Weight:	Optimal
<i>Myotis sodalis</i>	Indiana Bat		
Weighted Viability Score:	2.86 - Good	Weight:	Obligate

Conservation Target Name: South-Central Interior Large Floodplain

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score

4 - Very Good

<i>Caprimulgus carolinensis</i>	Chuck-will's-widow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Chaetura pelagica</i>	Chimney Swift		
Weighted Viability Score:	2.71 - Good	Weight:	Optimal
<i>Dendroica cerulea</i>	Cerulean Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Empidonax virescens</i>	Acadian Flycatcher		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Haliaeetus leucocephalus</i>	Bald Eagle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Hylocichla mustelina</i>	Wood Thrush		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Limnothlypis swainsonii</i>	Swainson's Warbler		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		
Weighted Viability Score:	2.82 - Good	Weight:	Suitable
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Passerina ciris</i>	Painted Bunting		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Protonotaria citrea</i>	Prothonotary Warbler		
Weighted Viability Score:	2.88 - Good	Weight:	Optimal
<i>Vireo flavifrons</i>	Yellow-throated Vireo		

Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Wilsonia citrina</i>	Hooded Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-Eared Bat		
Weighted Viability Score:	4 - Very Good	Weight:	Suitable
<i>Myotis austroriparius</i>	Southeastern Myotis		
Weighted Viability Score:	3.36 - Very Good	Weight:	Suitable
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Conservation Target Name: Southern Arkansas Calcareous Prairie

Umbrella Status: Covered by Habitat Conservation Target

Weighted Viability Score 3.33 - Very Good

<i>Aimophila aestivalis</i>	Bachman's Sparrow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Colinus virginianus</i>	Northern Bobwhite		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Dendroica discolor</i>	Prairie Warbler		
Weighted Viability Score:	2.31 - Fair	Weight:	Optimal
<i>Falco sparverius</i>	American Kestrel		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Passerina ciris</i>	Painted Bunting		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Leavenworthia aurea</i>	Golden Glade Cress		
Weighted Viability Score:	3.5 - Very Good	Weight:	Obligate
<i>Lesquerella angustifolia</i>	Threadleaf Bladderpod		
Weighted Viability Score:	3.5 - Very Good	Weight:	Optimal

<i>Thalictrum arkansanum</i>	Arkansas Meadow-Rue		
Weighted Viability Score:	3.5 - Very Good	Weight:	Obligate

Conservation Target Name: West Gulf Coastal Plain Pine-Hardwood Forest (Flatwoods)

Umbrella Status: Covered by Habitat Conservation Target
 Weighted Viability Score 1.92 - Fair

<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Conservation Target Name: West Gulf Coastal Plain Small Stream/River Forest

Umbrella Status: Covered by Habitat Conservation Target
 Weighted Viability Score 3 - Good

<i>Hyla avivoca</i>	Bird-voiced Tree Frog		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Caprimulgus carolinensis</i>	Chuck-will's-widow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Chaetura pelagica</i>	Chimney Swift		
Weighted Viability Score:	2.71 - Good	Weight:	Optimal
<i>Dryocopus pileatus</i>	Pileated Woodpecker		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Empidonax virescens</i>	Acadian Flycatcher		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Haliaeetus leucocephalus</i>	Bald Eagle		
Weighted Viability Score:	2.75 - Good	Weight:	Optimal
<i>Hylocichla mustelina</i>	Wood Thrush		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal

<i>Limnothlypis swainsonii</i>	Swainson's Warbler		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker		
Weighted Viability Score:	2.82 - Good	Weight:	Optimal
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Suitable
<i>Oporornis formosus</i>	Kentucky Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Passerina ciris</i>	Painted Bunting		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Protonotaria citrea</i>	Prothonotary Warbler		
Weighted Viability Score:	2.88 - Good	Weight:	Optimal
<i>Vireo flavifrons</i>	Yellow-throated Vireo		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Wilsonia citrina</i>	Hooded Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Odocoileus virginianus</i>	White-tailed deer		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Nerodia cyclopion cyclopion</i>	Mississippi Green Water Snake		
Weighted Viability Score:	3 - Good	Weight:	Optimal

Conservation Target Name: West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough, OK)

Umbrella Status: Covered by Habitat Conservation Target
Weighted Viability Score: 3 - Good

<i>Caprimulgus carolinensis</i>	Chuck-will's-widow		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Chaetura pelagica</i>	Chimney Swift		

Weighted Viability Score:	2.71 - Good	Weight:	Suitable
<i>Empidonax virescens</i>	Acadian Flycatcher		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Falco sparverius</i>	American Kestrel		
Weighted Viability Score:	2.75 - Good	Weight:	Suitable
<i>Haliaeetus leucocephalus</i>	Bald Eagle		
Weighted Viability Score:	2.75 - Good	Weight:	Suitable
<i>Hylocichla mustelina</i>	Wood Thrush		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Icterus spurius</i>	Orchard Oriole		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Limnothlypis swainsonii</i>	Swainson's Warbler		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Meleagris gallopavo</i>	Wild Turkey		
Weighted Viability Score:	2.52 - Good	Weight:	Marginal
<i>Oporornis formosus</i>	Kentucky Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Passerina ciris</i>	Painted Bunting		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Protonotaria citrea</i>	Prothonotary Warbler		
Weighted Viability Score:	2.88 - Good	Weight:	Optimal
<i>Vireo flavifrons</i>	Yellow-throated Vireo		
Weighted Viability Score:	2.56 - Good	Weight:	Optimal
<i>Vireo griseus</i>	White-eyed Vireo		
Weighted Viability Score:	2.5 - Fair	Weight:	Optimal
<i>Wilsonia citrina</i>	Hooded Warbler		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable
<i>Crotalus horridus</i>	Timber Rattlesnake		
Weighted Viability Score:	2.5 - Fair	Weight:	Suitable

Table E.3 Ouachita National Forest Terrestrial Species of Viability Concern with Associated Communities and/or Habitat Elements (Associated Conservation Targets) and Weighted Viability Scores* and Conditions

* Weighted viability scores are a weighted average of all Indicators associated with each Species, Conservation Target, and Key Factor. Key Factors/Indicators for ecosystem-level Conservation Targets are used to quantify overall ecological health, but may not directly address individual species requirements. Carefully note the relevance of all indicators that relate back to Species, Conservation Targets, and Key Factors.

The current condition and rank of each Associated Conservation Target are shown in Table E.4.

Taxa: Amphibian		
<i>Ambystoma annulatum</i>	Ringed Salamander	
Weighted Viability Score*: 2.94 – Good	S Rank: S4/- (AR/OK)	G Rank: G4
Comments: Ouachita population possibly in decline since 1999, cause is uncertain but may be drought related (ANHI 2003, Anderson, J.D. 1965, Anderson, P. 1965, Black and Dellinger 1938, Brussock and Brown 1982, Briggler 1998, Conant and Collins 1991, Cope 1886, Cope 1887, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dowling 1956, Hurter and Strecker 1909, Hutcherson and others 1989, Johnson 1977, McAllister and others 1995d, McDaniel 1975, McDaniel and Saugey 1977, Noble and Marshall 1929, Nyman and others 1993, Peterson and others 1992, Petranks 1998, Reagan 1974a, Schmidt 1953, Spotila and Beumer 1970, Stejneger and Barbour 1917, Strecker 1924, Taylor 1935, Tihen 1958, Trapp 1956, 1957, Trapp 1959, Trauth 1980b, Trauth 2000, Trauth and others 1989b, 2004, Trauth and Cartwright 1989, Turnipseed and Gallagher 1991, USDA FS 1999, Wilson 1995).		
Associated Conservation Targets	Ouachita Mesic Hardwood Forest and Guild Habitat	
	Ouachita Mountain Forested Seep	
	Ouachita Ponds, Lakes and Water Holes	
	Ouachita Riparian	
<i>Ambystoma talpoideum</i>	Mole Salamander	
Weighted Viability Score*: 2.86 – Good	S Rank: S3/- (AR/OK)	G Rank: G5
Comments: Appears to be more common and widespread than early surveys indicated. Found to occur along the southeastern edge of the Ouachita in lowland mesic areas (ANHI 2003, Bishop 1943, Boyd and Vickers 1963, Carr and Goin 1943, Conant and Collins 1991, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dundee and Rossman 1989, Hardy and Raymond 1980, McAllister and Trauth 1996a, Meshaka and McLarty 1988, Mount 1975, Parker 1947, Patterson 1978, Plummer and Dye 1992, Raymond and Hardy 1990, Raymond and Hardy 1991, Reagan 1974a, Robison and Winters 1978, Semlitsch 1985, Semlitsch 1987a, Semlitsch 1987b, Shoop 1960, Shoop 1964, Smith 1961, Smith and others 1984, Sutton and Paige 1980, Trauth and others 1993a, Trauth and others 1995b, 2004, USDA FS 1999, Wilson 1995).		
Associated Conservation Targets	Ouachita Dry-Mesic Oak Forest	
	Ouachita Mesic Hardwood Forest and Guild Habitat	
	Ouachita Mountain Forested Seep	
	Ouachita Pine-Oak Forest	
	Ouachita Ponds, Lakes and Water Holes	
	Ouachita Riparian	
<i>Desmognathus brimeylorum</i>	Ouachita Dusky Salamander	
Weighted Viability Score*: 2.67 - Good	S Rank: S4/S3 (AR/OK)	G Rank: G3/G4
Comments: AR/OK-Endemic to the Ouachita Mtn. Region. Locally abundant. Outstanding taxonomic issues related to range overlap with D. conanti. Ozark NF population occurs only on Mount Magazine (ANHI 2003, Bacon 1976, Black and Dellinger 1938, Burt 1935, Chaney 1949, Conant 1958, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dowling 1957, Fowler and Dunn 1918, Hay 1892, Hurter and Strecker 1909, Jamieson and Trauth 2001, Karlin and others 1993, McAllister 1995b, Means 1974, Means 1999, ONHI 2003, Sever and Trauth 1990, Smith 1960, Stejneger 1894, Strecker 1924, Strecker and Williams 1928, Taylor and others 1990, Taylor 1935, Trauth and others 1990, 2004, Trauth and Wilhide 1999, Trauth 1988a, USDA FS 1999, Verrell 1997, Wilson 1995).		
Associated Conservation Targets	Ouachita Mountain Forested Seep	
	Ouachita Rivers and Streams	
<i>Eurycea multiplicata multiplicata</i>	Many-ribbed Salamander	
Weighted Viability Score*: 3.1 – Good	S Rank: S4/- (AR/OK)	G Rank: G4T4
Comments: Endemic to the Arkansas River Valley and Ouachita and the margins of adjacent ecoregions. Locally abundant. Taxonomic issues outstanding: complex may be divided into two or more species. Known from south side of Mt. Magazine (ANHI 2003, Bishop 1943, Black and Dellinger 1938, Conant and Collins 1998, Cope 1869, Cope 1889, Dowling 1957, Dundee 1958, Dundee 1965a, Dunn 1926, Fowler and Dunn 1918, Hurter and Strecker 1909, Loomis and Webb 1951, Strecker 1924, Trauth and others 2004).		
Associated Conservation Targets	Ouachita Mountain Forested Seep	
	Ouachita Rivers and Streams	

<i>Hemidactylum scutatum</i>		Four-toed Salamander	
Weighted Viability Score*: 2.55 – Good		S Rank: S2/- (AR/OK)	G Rank: G5
Comments: Ozark population known from only one specimen outside Forest boundry, more field research required. Locally common in the Ouachitas. Both populations are highly disjunct (ANHI 2003, Bishop 1943, Bleakney and Cook 1957, Carter 1968, Conant and Collins 1998, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dellinger and Black 1938, Dowling 1957, Dundee 1968, Dunn 1926, Harris and Gill 1980, Hurter and Strecker 1909, Hurter and Strecker 1909, Martof 1955, Neill 1963, ONHI 2003, Reagan 1974a, Saugey and Trauth 1991, Smith and others 1984, Strecker 1924, Trauth and Caldwell 1986, Trauth and Cochran 1991, Trauth and others 2004, USDA FS 1999, Wilson 1995, Wood 1955).			
Associated Conservation Targets	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Mountain Forested Seep		
<i>Hyla avivoca</i>		Bird-voiced Tree Frog	
Weighted Viability Score*: 2.5 - Fair		S Rank: S2/- (AR/OK)	G Rank: G5
Comments: Peripheral to the Ouachita NF. Known only from the southern extent along the Ouachita River drainage (ANHI 2003, Conant and Collins 1998, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Davis and Hollenback 1978, Fulmer and Tumlison 2002, Jamieson and others 1993, McAllister and others 1993b, Mount 1975, ONHI 2003, Secor 1988, Smith 1966b, Trauth 1992b, Trauth and others 2004, Trauth and Robinette 1990a, Trauth and Robinette 1990b, Turnipseed 1976, Turnipseed 1980b, USDA FS 1999, Volpe and others 1961, Wilson 1995).			
Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat		
	Ouachita Ponds, Lakes and Water Holes		
	Ouachita Rivers and Streams		
	West Gulf Coastal Plain Small Stream/River Forest		
<i>Plethodon caddoensis</i>		Caddo Mountain Salamander	
Weighted Viability Score*: 2.59 – Good		S Rank: S2/- (AR/OK)	G Rank: G2
Comments: Endemic to the Caddo Mountains with an extremely restricted range. Inhabits seepage areas, dry-mesic shaded valley slopes, and rocky wooded hillsides where it lives under rocks and in rotting logs. Found to occur primarily on north-facing mesic slopes and riparian areas (ANHI 2003, Anthony 1993, Anthony and others 1994, Arnold 1977, Askins 2001, Atwill and Trauth 1988, Baker 1994, Blair and Lindsay 1965, Blair 1957, Conant and Collins 1991, 1998, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, 2003P, Dillinger and Black 1938, Dowling 1956, 1957, Duncan and Highton 1979, Dunn 1926, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Grobman 1944, Guyette and Spetich 2003, Highton 1962, 1997, Highton and Webster 1976, Journey and others 2001, Larson and Highton 1978, Law and others 1994, Masters 1991, Masters and others 1995, McAllister and others 2002, NatureServe 2003, 2003a, Palmer 1924, Pert 2000, Petranka 1998, Plummer 1982, Pope 1964, Pope and Pope 1951, Reagan 1974a, Robison and Allen 1995, Rudolph 1978, Saugey and others 1985, Smith and others 1984, Sparks and others 1999, Spetich 2004, Spotila 1972, Taylor and others 1990, TNC 2003, Trani and others 2001, Trauth and others 2000, 2004, Trauth and Wilhide 1999, USDA FS 1991, 1997, 1997a, 1999, Wilson 1995, Winter and others 1986).			
Associated Conservation Targets	Ouachita Dry-Mesic Oak Forest		
	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Pine-Oak Forest		
	Ouachita Riparian		
<i>Plethodon fourchensis</i>		Fourche Mountain Salamander	
Weighted Viability Score*: 2.59 – Good		S Rank: S2/- (AR/OK)	G Rank: G2Q
Comments: AR-Endemic to the Fourche and Irons Fork Mountains in the Ouachita NF with a highly restricted range. Uncommon. Extremely difficult to inventory due to reliance on specific precipitation regime. Inhabits dry-mesic shaded valley slopes and rocky wooded hillsides where it lives under rocks and in rotting logs (ANHI 2003, Arnold 1977, Askins 2001, Baker 1994, Blair and Lindsay 1965, Conant and Collins 1991, 1998, Crump 2003, 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, 2003P, Dillinger and Black 1938, Dowling 1957, Duncan and Highton 1979, Dunn 1926, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Grobman 1944, Guyette and Spetich 2003, Highton 1962, 1997, Highton and Webster 1976, Journey and others 2001, Larson and Highton 1978, Law and others 1994, Lohoefer and Jones 1991, Masters 1991, Masters and others 1995, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Petranka 1998, Plummer 1982, Robison and Allen 1995, Rudolph 1978, Smith and others 1984, Sparks and others 1999, Spetich 2004, Taylor and others 1990, TNC 2003, Trani and others 2001, Trauth and others 2004, Trauth and Wilhide 1999, USDA FS 1991, 1997, 1997a, 1999, Wilson 1995, Winter and others 1986).			
Associated Conservation Targets	Ouachita Dry-Mesic Oak Forest		
	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Pine-Oak Forest		
	Ouachita Riparian		
<i>Plethodon kiamichi</i>		Kiamichi Mountain Salamander	
Weighted Viability Score*: 2.59 – Good		S Rank: -/S2 (AR/OK)	G Rank: G2Q
Comments: Endemic to Cow Creek Mtn. of the Kiamichi system in the Ouachita Mtns. Locally common but very restricted range. Inhabits seepage areas, dry-mesic shaded valley slopes and rocky wooded hillsides where it lives under rocks and in rotting logs (ANHI 2003, Arnold 1977, Askins 2001, Baker 1994, Blair and Lindsay 1965, Conant and Collins 1991, 1998, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, 2003P, Dillinger and Black 1938, Dowling 1957, Duncan and Highton 1979, Dunn 1926, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Grobman 1944, Guyette and Spetich 2003, Highton 1962, 1989, 1997, Highton and Webster 1976, Larson and Highton 1978, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, McAllister and others 2002, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Petranka 1998, Robison and Allen 1995, Rudolph 1978, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, Trauth and others 2004, USDA FS 1991, 1997, 1997a, 1999, Wilson 1995, Winter and others 1986).			

Associated Conservation Targets	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Pine-Oak Forest
	Ouachita Riparian
<i>Plethodon ouachitae</i> Rich Mountain Salamander	
Weighted Viability Score*: 2.67 – Good S Rank: S2/S2 (AR/OK) G Rank: G2G3	
Comments: Endemic to Rich Mtn of the Ouachita Mtn. Ecoregion: extremely restricted range. Inhabits seepage areas, mesic shaded valley slopes and rocky wooded hillsides where it lives under rocks and in rotting logs (ANHI 2003, Anthony 1993, Anthony 1995, Anthony and others 2002, Anthony and Wicknick 1993, Arnold 1977, Askins 2001, Atwill and Trauth 1988, Baker 1994, Black and Dellinger 1938, Blair and Lindsay 1965, Burt 1935, Conant and Collins 1991, 1998, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, 2003P, Dillinger and Black 1938, Dowling 1957, Duncan and Highton 1979, Dunn 1926, Dunn and Heinze 1933, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Grobman 1944, Guyette and Spetich 2003, Highton 1962, 1989, 1997, Highton and Webster 1976, Journey and others 2001, Larson and Highton 1978, Law and others 1994, Masters 1991, Masters and others 1995, McAllister and others 2002, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Petranka 1998, Pope and Pope 1951, Reagan 1974a, Robison and Allen 1995, Rudolph 1978, Sievert 1986, Smith and others 1984, Sparks and others 1999, Spetich 2004, Taylor and others 1990, Thurow 1976, TNC 2003, Trani and others 2001, Trauth and others 2004, Trauth and Wilhide 1999, USDA FS 1991, 1997, 1997a, 1999, Wilson 1995, Winter and others 1986). Population appears to have declined in recent years, possibly related to drier conditions, partially from loss of canopy due to oak borer and recent ice damage.	
Associated Conservation Targets	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Mountain Forested Seep
	Ouachita Riparian
<i>Plethodon sequoyah</i> Sequoyah Slimy Salamander	
Weighted Viability Score*: 2.59 – Good S Rank: -/S2 (AR/OK) G Rank: G2Q	
Comments: Endemic with extremely restricted range. Site locality at Beaver's Bend State Park, OK. One specimen known from near Lake DeQueen in AR. Neither site is actually on NF lands; however the OK site is within the Proclamation boundary. This salamander like other plethodontids inhabits seepage areas, dry-mesic shaded valley slopes and rocky wooded hillsides where it lives under rocks and in rotting logs (ANHI 2003, Arnold 1977, Askins 2001, Baker 1994, Black and Sievert 1989, Conant and Collins 1991, 1998, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, 2003P, Dillinger and Black 1938, Dowling 1957, Duncan and Highton 1979, Dunn 1926, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Grobman 1944, Guyette and Spetich 2003, Highton 1962, 1989, 1997, Highton and Webster 1976, Huntington and Stuniman 1993, Journey and others 2001, Larson and Highton 1978, Law and others 1994, Masters 1991, Masters and others 1995, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Petranka 1998, Robison and Allen 1995, Rudolph 1978, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, Trauth and others 2004, USDA FS 1991, 1997, 1997a, 1999, Winter and others 1986).	
Associated Conservation Targets	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Mountain Forested Seep
	Ouachita Pine-Oak Forest
	Ouachita Riparian
<i>Plethodon serratus</i> Southern Redback Salamander	
Weighted Viability Score*: 2.5 – Fair S Rank: S4/- (AR/OK) G Rank: G5	
Comments: AR-Ouachita population disjunct from the MO & southern App. populations. Inhabits seepage areas, dry-mesic shaded valley slopes, and rocky wooded hillsides where it lives under rocks and in rotting logs. Locally abundant (ANHI 2003, Atwill and Trauth 1988, Black and Dellinger 1938, Camp 1988, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dowling 1957, Dunn 1926, Fletcher and others 1992, Herbeck and Semlitsch 2000, Highton and Webster, Johnson 1987, McAllister and others 2002, ONHI 2003, Pope and Pope 1951, Sayler 1966, Smith 1963, Stone 1904, Strecker 1924, Taylor and others 1990, Trauth and others 2004, Trauth and others 1990, 2004, Trauth and Wilhide 1999, USDA FS 1999, Wilson 1995, Winter and others 1986).	
Associated Conservation Targets	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Pine-Oak Forest
	Ouachita Riparian
<i>Pseudacris streckeri streckeri</i> Strecker's Chorus Frog	
Weighted Viability Score*: 3.42 - Very Good S Rank: S2/- (AR/OK) G Rank: G5T5	
Comments: Not known to occur on the Ouachita NF. Peripheral. Primarily a riparian AR River Valley species in AR in sandy habitat. Also known from a single locality just south of Mena, Polk Co., AR (ANHI 2003, Black and Dellinger 1938, Bragg 1942, Burt 1935, Butterfield and others 1989, Conant and Collins 1998, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dowling 1957, Fesperman 1986, Hurter and Strecker 1909, Parker 1947, Smith 1966a, Taylor 1935, Trauth and others 1990, 2004, Turnipseed and Shepherd 1965, USDA FS 1999, Wilson 1995).	

Associated Conservation Targets	Ouachita Ponds, Lakes and Water Holes
	Ouachita Riparian
	Seeps with Minimal Woody Vegetation
<i>Rana areolata circulosa</i> Northern Crawfish Frog	
Weighted Viability Score*: 3.48 - Very Good S Rank: S3/- (AR/OK) G Rank: G4T4	
Comments: Not known to occur on the Ouachita NF. Except for a Scott Co. occurrence near Waldren, AR, this species is primarily associated with wide floodplains systems and marginal uplands associated around the edges of the Ozark and Ouachita ecoregions. (ANHI 2003, Bacon and Anderson 1976, Black and Dellinger 1938, Byrd and Hanebrink 1974, Collins 1974, Conant and Collins 1991, Conant and Collins 1998, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dowling 1957, Johnson 1977, Plummer 1977f, Plummer and White 1992, Taylor 1935, Trauth and others 1990, 2004, USDA FS 1999, Wilson 1995).	
Associated Conservation Targets	Ouachita Ponds, Lakes and Water Holes
	Ouachita Riparian
	Seeps with Minimal Woody Vegetation

Taxa: Bird

<i>Aimophila aestivalis</i> Bachman's Sparrow	
Weighted Viability Score*: 2.5 – Fair S Rank: S3/S2? (AR/OK) G Rank: G3	
Comments: Common in Shortleaf pine-bluestem restoration areas on the Ouachita National Forest due to the early-regeneration vegetation component; uncommon on the Ozark National Forest (Alterman and Bednarz 2002, ANHC 2003, Annand and Thompson 1977, Askins 2001, 2002, Baery 1927, Baker 1994, Clawson 1982, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Crump and Davis 2003, Bukenhofer and Hedrick 1997, Bukenhofer and others 1994, DeGraff 1991, Dunning 1993, Dunning and others 1995, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch 1991, Finch and Stangel 1993, Fitzgerald 2000, Ford and others 2002, Foti and Glenn 1991, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guldin and others 2004, Guyette and Spetich 2003, Haggerty 1988, Hamel 1992, Hardin and Probasco 1983, Hardin and others 1982, Heuschmann and others 2000, Jacobs 2001, James 1971, James and Neal 1986, Jumey and others 2001, Kellner Unpub., King and others 1998, Law and others 1994, Liechty and others 2005, Liu and others 1995, Lochmiller and others 1993, Luckow 2000, Martin and Finch 1995, Masters 1991, Masters and others 1993, 1995, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Probst and Thompson 1996, Robbins and Easterla 1992, Robinson and others 1995, 1999, Rodewald and Smith 1998, Salveter 1994, Smith and others 1984, Sparks 1996, Sparks and others 1999, 2002, Spetich 2004, Thompson 1993, 1995, Thompson and DeGraff 2001, Thompson and Fritzell 1990, Thompson and others 1992 993 1995, 1996, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999, Wilson 1994, Wilson and others 1995).	
Associated Conservation Targets	Forested-Dense or Semi-open Pine Guild Habitat
	Oak Woodlands Guild Habitat
	Ouachita Dry Oak Woodland
	Ouachita Pine/Bluestem Woodland and Guild Habitat
	Ouachita Pine-Oak Forest
	Ouachita Pine-Oak Woodland
	Southern Arkansas Calcareous Prairie
<i>Caprimulgus carolinensis</i> Chuck-will's-widow	
Weighted Viability Score*: 2.5 - Fair S Rank: S4B/- (AR/OK) G Rank: G5	
Comments: Common on the Ouachita NF (Ouachita NF Landbird Point Surveys 1996-2002), Uncommon to locally common on the Ozark-St. Francis NF (ANHC 2003, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James and Neal 1986, Martin and Finch 1995, Robbins and Easterla 1992, Straight and Cooper 2000, Wilson 1994, Wilson and others 1995).	
Associated Conservation Targets	Forested-Dense or Semi-open Pine Guild Habitat
	Forested-Dry Upland Hardwood & Hardwood/Pine Guild
	Ouachita Dry Oak Woodland
	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Pine-Oak Forest
	Ouachita Riparian
	South-Central Interior Large Floodplain
	West Gulf Coastal Plain Small Stream/River Forest
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)

<i>Caprimulgus vociferus</i>		Whip-poor-will	
Weighted Viability Score*: 2.48 – Fair		S Rank: S4B/- (AR/OK)	G Rank: G5
Comments: Common in the Ozark-St. Francis NF, Uncommon to locally common in the Ouachita NF (ANHC 2003, Bent 1989, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James and Neal 1986, Martin and Finch 1995, Robbins and Easterla 1992, Straight and Cooper 2000, Wilson 1994, Wilson and others 1995).			
Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat		
	Forested-Dry Upland Hardwood & Hardwood/Pine Guild		
	Ouachita Dry Oak Woodland		
	Ouachita Dry-Mesic Oak Forest		
	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Pine-Oak Forest		
<i>Chaetura pelagica</i>		Chimney Swift	
Weighted Viability Score*: 2.71 - Good		S Rank: -/- (AR/OK)	G Rank: G5
Comments: Settled areas provide optimal habitat, forested areas only provide suitable habitat dependent upon the presence of large diameter hollow trees (ANHC 2003, Cink and Collins 2002, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James and Neal 1986, Martin and Finch 1995, Robbins and Easterla 1992, Wilson 1994, Wilson and others 1995).			
Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat		
	Forested-Dry Upland Hardwood & Hardwood/Pine Guild		
	Large Diameter Hollow Trees		
	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Riparian		
	South-Central Interior Large Floodplain		
	West Gulf Coastal Plain Small Stream/River Forest		
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)		
<i>Colinus virginianus</i>		Northern Bobwhite	
Weighted Viability Score*: 2.5 - Fair		S Rank: S5/- (AR/OK)	G Rank: G5
Associated Conservation Targets	Grass/Forb Guild Habitat		
	Oak Woodlands Guild Habitat		
	Ouachita Dry Oak Woodland		
	Ouachita Shortleaf Pine-Bluestem Woodland		
	Ouachita Pine-Oak Woodland		
	Shrubland Guild Habitat		
	Southern Arkansas Calcareous Prairie		
<i>Dendroica cerulea</i>		Cerulean Warbler	
Weighted Viability Score*: 2.5 - Fair		S Rank: S2/S2B (AR/OK)	G Rank: G4
Comments: Ozark-St. Francis and Ouachita: Uncommon. Mature hardwood obligate (ANHC 2003, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Hamel 1992, 2000, Jacobs 2001, James 1971, James and Neal 1986, James and others 2001, Martin and Finch 1995, Probst and Thompson 1996, Robbins and Easterla 1992, Robinson and others 1989, 1995, Rodewald and Smith 1998, Rosenberg and others 2000, Wilson 1994, Wilson and others 1995).			
Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat		
	Large Trees near Water		
	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Riparian		
	South-Central Interior Large Floodplain		

<i>Dendroica discolor</i>		Prairie Warbler	
Weighted Viability Score*: 2.31 - Fair		S Rank: -/- (AR/OK)	G Rank: G5
Comments: Ozark-St. Francis and Ouachita: Locally common to uncommon (Alterman and others 2002, ANHC 2003, Baerg 1927, Bukenhofer and Hedrick 1997, Bukenhofer and others 1994, Clawson 1982, Crump and Davis 2003, Dickson and others 1983, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch 1991, Foti and Glenn 1991, Guldin and others 2004, Heuschmann and others 2000, Liechty and others 2005, Lochmiller and others 1993, Luckow 2000, Martin and Finch 1995, Masters and others 1993, Robinson and others 1995, Sparks 1996, Sparks and others 2002, Wilson 1994, Wilson and others 1995).			
Associated Conservation Targets	Forested-Dense or Semi-open Pine Guild Habitat		
	Forested-Dry Upland Hardwood & Hardwood/Pine Guild		
	Grass/Forb Guild Habitat		
	Oak Woodlands Guild Habitat		
	Ouachita Dry Oak Woodland		
	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Shortleaf Pine-Bluestem Woodland		
	Shrubland Guild Habitat		
		Southern Arkansas Calcareous Prairie	
<i>Empidonax virescens</i>		Acadian Flycatcher	
Weighted Viability Score*: 2.5 - Fair		S Rank: S4B/- (AR/OK)	G Rank: G5
Comments: Still common on the Ozark-St. Francis and Ouachita NF, but declining range wide. Ozark-St. Francis NF is a center of abundance for this species (ANHC 2003, Annand and Thompson 1997, Baerg 1927, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch 1991, Finch and Stangel 1993, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James 1971, James and Neal 1986, Martin and Finch 1995, Pingjun 1994, Probst and Thompson 1996, Robbins and Easterla 1992, Robinson and others 1995, Rodewald and Smith 1998, Smith and Prather 2000, Thompson 1995, Thompson and Fritzell 1990, Thompson and others 1992, 1995, 1996, Wilson 1994, Wilson and others 1995, Whitehead and Taylor 2002).			
Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat		
	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Riparian		
	South-Central Interior Large Floodplain		
	West Gulf Coastal Plain Small Stream/River Forest		
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)		
<i>Falco sparverius</i>		American Kestrel	
Weighted Viability Score*: 2.75 - Good		S Rank: -/- (AR/OK)	G Rank: G5
Comments: Sporadic and uncommon on National Forest lands in AR (ANHC 2003, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James and Neal 1986, Martin and Finch 1995, Robbins and Easterla 1992, Smallwood and Bird 2002, Wilson 1994, Wilson and others 1995).			
Associated Conservation Targets	Forested-Dense or Semi-open Pine Guild Habitat		
	Grass/Forb Guild Habitat		
	Oak Woodlands Guild Habitat		
	Ouachita Dry Oak Woodland		
	Ouachita Pine/Bluestem Woodland and Guild Habitat		
	Ouachita Pine-Oak Forest		
	Shrubland Guild Habitat		
	Snags		
	Southern Arkansas Calcareous Prairie		
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)		
<i>Haliaeetus leucocephalus</i>		Bald Eagle	
Weighted Viability Score*: 2.75 - Good		S Rank: S2B/- (AR/OK)	G Rank: G4
Comments: Breeding: limited to large lakes and rivers in the vicinity of the Ouachita National Forest and the Ozark-St. Francis National Forest. Known Critical Communal Roosts: Brock Creek Watershed, Ozark-St. Francis National Forest (ANH 2003, Crump and Davis 2003, Duzan and others 2003, 2003A, ONHI 2003).			
Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat		
	Forested-Dense or Semi-open Pine Guild Habitat		
	Large Trees near Water		
	Ouachita Pine-Oak Forest		
	Ouachita Ponds, Lakes and Water Holes		
	Ouachita Rivers and Streams		
	South-Central Interior Large Floodplain		
	West Gulf Coastal Plain Small Stream/River Forest		
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)		

<i>Helmitheros vermivorus</i>		Worm-eating Warbler	
Weighted Viability Score*: 2.59 - Good		S Rank: S4B/- (AR/OK)	G Rank: G5
Comments: Low breeding density in both Ouachita and Ozark-St. Francis NFs (ANHC 2003, Baerg 1927, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch 1991, Finch and Stangel 1993, Fitzgerald 2000, Hamel 1992, Hanners and Patton 1998, Jacobs 2001, James and Neal 1986, Kellner Unpublished, Martin and Finch 1995, Pingjun 1994, Probst and Thompson 1996, Robbins and Easterla 1992, Robinson and others 1995, Rodewald and Smith 1998, Smith and Prather 2000, Thompson and Fritzell 1990, Thompson and others 1992, Wilson 1994, Wilson and others 1995). In western Arkansas, this species is near the western extent of its range.			
Associated Conservation Targets	Forested-Dense or Semi-open Pine Guild Habitat		
	Forested-Dry Upland Hardwood & Hardwood/Pine Guild		
	Ouachita Dry-Mesic Oak Forest		
	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Pine-Oak Forest		
	Ouachita Riparian		
<i>Hylocichla mustelina</i>		Wood Thrush	
Weighted Viability Score*: 2.5 - Fair		S Rank: -/- (AR/OK)	G Rank: G5
Comments: Common to uncommon on the Ozark-St. Francis and Ouachita NF. Declining range wide. Needs moist sites with understory & hardwood midstory (Anders and others 1998, ANHC 2003, Annand and Thompson 1997, Artman and Downhower 2003, Baerg 1927, Clawson 1982, Crump and Davis 2003, DeGraaf 1991, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch 1991, Finch and Stangel 1993, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James 1971, James and Neal 1986, Kellner Unpublished, Martin and Finch 1995, Pingjun 1994, Probst and Thompson 1996, Robbins and Easterla 1992, Robinson and others 1995, Roth and others 1996, Salveter 1994, Thompson 1995, Thompson and Fritzell 1990, Thompson and others 1995, 1996, Wilson 1994, Wilson and others 1995).			
Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat		
	Forested-Dense or Semi-open Pine Guild Habitat		
	Ouachita Dry-Mesic Oak Forest		
	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Riparian		
	South-Central Interior Large Floodplain		
	West Gulf Coastal Plain Small Stream/River Forest		
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)		
<i>Icterus spurius</i>		Orchard Oriole	
Weighted Viability Score*: 2.5 - Fair		S Rank: S4B/- (AR/OK)	G Rank: G5
Comments: Uncommon on both National Forests (ANHC 2003, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch 1991, Finch and Stangel 1993, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James 1971, James and Neal 1986, Martin and Finch 1995, Robbins and Easterla 1992, Scharf and Kren 1996, Thompson 1995, Thompson and others 1996, Wilson 1994, Wilson and others 1995).			
Associated Conservation Targets	Ouachita Riparian		
	South-Central Interior Large Floodplain		
	West Gulf Coastal Plain Small Stream/River Forest		
	Forested-Bottomland Hardwood Guild Habitat		
	Oak Woodlands Guild Habitat		
	Shrubland Guild Habitat		
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)		
<i>Limnothlypis swainsonii</i>		Swainson's Warbler	
Weighted Viability Score*: 2.56 - Good		S Rank: S3/S1 (AR/OK)	G Rank: G4
Comments: Uncommon in both forests. More common on the St. Francis NF. Prefer up to 20 acres of switchcane or areas of dense shrub in early succession (ANHC 2003, Brown and Dickson 1994, Carrie 1996, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James and Neal 1986, Martin and Finch 1995, Robbins and Easterla 1992, Wilson 1994, Wilson and others 1995).			
Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat		
	Ouachita Mesic Hardwood Forest and Guild Habitat		
	South-Central Interior Large Floodplain		
	West Gulf Coastal Plain Small Stream/River Forest		
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)		
<i>Melanerpes erythrocephalus</i>		Red-headed Woodpecker	
Weighted Viability Score*: 2.82 - Good		S Rank: -/- (AR/OK)	G Rank: G5

Comments: Uncommon on the Ozark-St. Francis and Ouachita NF. More numerous where abundance of snags are present (ANHC 2003, Bent 1964, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James and Neal 1986, Kilham 1992, Martin and Finch 1995, Wilson 1994, Wilson and others 1995).

Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat
	Large Diameter Hollow Trees
	Oak Woodlands Guild Habitat
	Ouachita Dry Oak Woodland
	Ouachita Pine/Bluestem Woodland and Guild Habitat
	Ouachita Pine-Oak Forest
	Ouachita Riparian
	Snags
	South-Central Interior Large Floodplain
	West Gulf Coastal Plain Small Stream/River Forest

Oporornis formosus

Kentucky Warbler

Weighted Viability Score*: 2.5 - Fair

S Rank: S4B/- (AR/OK)

G Rank: G5

Comments: Common on both national forests declining range-wide (ANHC 2003, Annand and Thompson 1997, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch and Stangel 1993, Fitzgerald 2000, Gibbs and Faaborg 1990, Hamel 1992, Jacobs 2001, James 1971, James and Neal 1986, James and others 1989, Kellner Unpublished, Martin and Finch 1995, McDonald 1998, Pingjun 1994, Robbins and Easterla 1992, Thompson and others 1992, 1995, 1996, Wenny and others 1993, Wilson 1994, Wilson and others 1995, USDA FS 1997).

Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat
	Forested-Dense or Semi-open Pine Guild Habitat
	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Pine-Oak Forest
	Ouachita Riparian
	West Gulf Coastal Plain Small Stream/River Forest
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)

Passerina ciris

Painted Bunting

Weighted Viability Score*: 2.56 - Good

S Rank: -/- (AR/OK)

G Rank: G5

Comments: Fairly abundant only within its preferred scrubby brush habitat (ANHC 2003, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James and Neal 1986, Lowther and others 1999, Martin and Finch 1995, Probst and Thompson 1996, Robison and others 1995, Wilson 1994, Wilson and others 1995).

Associated Conservation Targets	Oak Woodlands Guild Habitat
	Ouachita Riparian
	Shrubland Guild Habitat
	South-Central Interior Large Floodplain
	Southern Arkansas Calcareous Prairie
	West Gulf Coastal Plain Small Stream/River Forest
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)

Picoides borealis

Red-cockaded Woodpecker

Weighted Viability Score*: 2.5 - Fair

S Rank: S2/S1 (AR/OK)

G Rank: G3

Comments: Limited to restored Shortleaf Pine-Bluestem Ecosystems on the Ouachita NF, Historically occurred in the Eastern portion of the Boston Mountains subdivision of the Ozark Ecoregion, currently extirpated from the Ozark-St. Francis NF (ANHC 2003, Bukenhofer and Hedrick 1997, Bukenhofer and others 1994, Clawson 1982, Conner and others 2003, Costa and others 1996, Crowder 1997, Crump and Davis 2003, Doster 1991, Doster and James 1998, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Foti and Glenn 1991, Guldin and others 2004, Hamel 1992, Hedrick and others 1998, Heuschmann and others 2000, Jacobs 2001, James and Neal 1986, Jennelle 2000, Liechty and others 2005, Lochmiller and others 1993, Luckow 2000, Martin and Finch 1995, Masters and others 1993, 1995, 2001, 2002, Masters and Wilson 1994, Montague 1995, Montague and others 1993, 1995, Neal 1992, 2002, Neal and Montague 1991, Neal and others 1992, 1993, 1993a, 1993b, 1998, Raulston 1992, Raulston and others 1996, Robison and others 1999, Smith and Neal 1991, Sparks 1996, Sparks and others 2002, Thill and others In Press, Wilson 1994, Wilson and others 1995, Withgott 1994, Withgott and others 1993, USDA FWS 2003).

Associated Conservation Targets	Ouachita Pine/Bluestem Woodland and Guild Habitat
	Ouachita Pine-Oak Woodland

Protonotaria citrea

Prothonotary Warbler

Weighted Viability Score*: 2.88 - Good

S Rank: S4B/- (AR/OK)

G Rank: G5

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Comments: Low breeding density in both forests, mature hardwood with cativities, cavity-nesting obligate, with the exception of the St. Francis and possibly Tiak districts (ANHC 2003, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch and Stangel 1993, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James 1971, James and Neal 1986, James and others 1989, King and others 1998, Martin and Finch 1995, Nolan and others 1999, Robbins and Easterla 1992, Robison and others 1999, Smith and Prather 2000, Thompson 1993, 1995, Thompson and Degraff 2001, Thompson and Fritzell 1990, Thompson and others 1992, 1993, 1995, 1996, Wilson 1994, Wilson and others 1995, USDA FS 1997).

Associated Conservation Targets

Forested-Bottomland Hardwood Guild Habitat
Large Diameter Hollow Trees
Snags
South-Central Interior Large Floodplain
West Gulf Coastal Plain Small Stream/River Forest
West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)

Sitta pusilla

Brown-headed Nuthatch

Weighted Viability Score*: 2.5 - Fair

S Rank: S4/- (AR/OK)

G Rank: G5

Comments: Common within Red-cockaded Woodpecker restoration areas on the Ouachita NF, Perpheral and rare on the Ozark-St. Francis NF (ANHC 2003, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James and Neal 1986, Martin and Finch 1995, Robbins and Easterla 1992, Wilson 1994, Wilson and others 1995, Withgott and Smith 1998).

Associated Conservation Targets

Forested-Dense or Semi-open Pine Guild Habitat
Ouachita Pine/Bluestem Woodland and Guild Habitat
Ouachita Pine-Oak Forest
Snags

Thryomanes bewickii

Bewick's Wren

Weighted Viability Score*: 2.5 - Fair

S Rank: S2/S4 (AR/OK)

G Rank: G5

Comments: Uncommon on the Ozark-St. Francis and Ouachita NF-only one EOR, Declining range wide (ANHC 2003, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James and Neal 1986, Kennedy and White 1997, Martin and Finch 1995, Robbins and Easterla 1992, Robinson and others 1999, Wilson 1994, Wilson and others 1995).

Associated Conservation Targets

Oak Woodlands Guild Habitat
Ouachita Dry Oak Woodland
Ouachita Pine-Oak Forest
Shrubland Guild Habitat

Vireo flavifrons

Yellow-throated Vireo

Weighted Viability Score*: 2.56 - Good

S Rank: -/- (AR/OK)

G Rank: G5

Comments: Low breeding densities in the Ozark-St. Francis and Ouachita NF (ANHC 2003, Annand and Thompson 1997, Baerg 1927, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch and Stangel 1993, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James and Neal 1986, Martin and Finch 1995, Robbins and Easterla 1992, Robinson and others 1995, Rodewald and James 1996, Rodewald and Smith 1998, Wilson 1994, Wilson and others 1995).

Associated Conservation Targets

Forested-Bottomland Hardwood Guild Habitat
Ouachita Mesic Hardwood Forest and Guild Habitat
Ouachita Riparian
South-Central Interior Large Floodplain
West Gulf Coastal Plain Small Stream/River Forest
West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)

Vireo griseus

White-eyed Vireo

Weighted Viability Score*: 2.5 - Fair

S Rank: S4B/- (AR/OK)

G Rank: G5

Comments: Uncommon to locally common on the Ozark-St. Francis and Ouachita NF (ANHC 2003, Annand and Thompson 1997, Baerg 1927, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch 1991, Finch and Stangel 1993, Fitzgerald 2000, Hamel 1992, Hopp and others 1995, Jacobs 2001, James 1971, James and Neal 1986, Kellner Unpublished, Kennedy and White 1997, Martin and Finch 1995, Robbins and Easterla 1992, Robinson and others 1999, Thompson 1995, Thompson and Fritzell 1990, Thompson and others 1996, Wilson 1994, Wilson and others 1995, USDA FS 1997).

Associated Conservation Targets

Ouachita Mesic Hardwood Forest and Guild Habitat
South-Central Interior Large Floodplain
West Gulf Coastal Plain Small Stream/River Forest
Central Interior Acidic Cliff and Talus
Central Interior Highlands Dry Acidic Glade and Barrens
Forested-Bottomland Hardwood Guild Habitat

	Forested-Dense or Semi-open Pine Guild Habitat
	Forested-Dry Upland Hardwood & Hardwood/Pine Guild
	Grass/Forb Guild Habitat
	Ouachita Dry-Mesic Oak Forest
	Ouachita Pine-Oak Forest
	Shrubland Guild Habitat
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)
<i>Wilsonia citrina</i> Hooded Warbler	
Weighted Viability Score*: 2.5 - Fair S Rank: S4B/S2B (AR/OK) G Rank: G5	
Comments: Common in appropriate breeding habitat on both national forests, needs the hardwood understory component (ANHC 2003, Annand and Thompson 1997, Baerg 1927, Clawson 1982, Crump and Davis 2003, Duzan and others 2003, 2003A, Evans and Kirkman 1980, Finch 1991, Finch and Stangel 1993, Fitzgerald 2000, Hamel 1992, Jacobs 2001, James 1971, James and Neal 1986, James and others 1989, Kellner Unpublished, Martin and Finch 1995, Pingjun 1994, Poole and Gill, Robbins and Easterla 1992, Robinson and others 1995, Smith and Prather 2000, Thompson 1995, Thompson and Fritzell 1990, Thompson and others 1996, Wilson 1994, Wilson and others 1995).	
Associated Conservation Targets	Forested-Bottomland Hardwood Guild Habitat
	Forested-Dense or Semi-open Pine Guild Habitat
	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Pine-Oak Forest
	Ouachita Riparian
	South-Central Interior Large Floodplain
	West Gulf Coastal Plain Small Stream/River Forest
	West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)
Taxa: Invertebrate	
<i>Lirceus bicuspidatus</i> An Isopod	
Weighted Viability Score*: 2.9 - Good S Rank: S3/- (AR/OK) G Rank: G3Q	
Comments: Not known to occur on the Ouachita NF. This isopod inhabits a variety of biotopes including small seep/springs and streams, and cave streams. Nothing more is known about the biology of this species, except that it is widely known from the mountainous region of Arkansas. (ANHI 2003, Robison & Allen, 1995).	
Associated Conservation Targets	Caves, Mines & Karst Habitat
	Ouachita Mountain Forested Seep
	Ouachita Rivers and Streams
<i>Nicrophorus americanus</i> American Burying Beetle	
Weighted Viability Score*: 2.75 - Good S Rank: S1/S1 (AR/OK) G Rank: G2G3	
Comments: In Arkansas, occurrences are limited to five counties in the western part of the state. Most of these occurrences are from federal lands, such as Fort Chaffee Military Reservation and the Ouachita National Forest (ANHI 2003, Carlton and Rothwein 1998, ONHI 2003 USDI FWS 1994).	
Associated Conservation Targets	Grass/Forb Guild Habitat
	Ouachita Dry Oak Woodland
	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Pine/Bluestem Woodland and Guild Habitat
	Ouachita Pine-Oak Forest
	Shrubland Guild Habitat
<i>Speyeria diana</i> Diana Fritillary	
Weighted Viability Score*: 2.5 - Fair S Rank: S2S3/- (AR/OK) G Rank: G3	
Comments: The Diana fritillary has undergone a range-wide decline, and no longer occurs over a substantial portion of its historic range with scattered occurrences in Arkansas. Recent sightings indicate that it is more common than known records indicate. Diana fritillary adults feed on nectar, and the larvae are known to feed on violets. Female adults are generally found in moist, wooded ravines and valleys, while the males wander widely in search of females in a variety of habitats far from suitable breeding habitat (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Jurney and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999). According to recent sightings on the Ouachita & Ozark Mtns., Diana fritillary adults are most frequently found in forested areas with nectar sources, particularly in fire-maintained communities (Dr. Craig Rudolph personal communication June 2003, Rudolph 2002, Rudolph and Ely 2000a, 2000b).	
Associated Conservation Targets	Central Interior Highlands Dry Acidic Glade and Barrens

	Grass/Forb Guild Habitat
	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Novaculite Glade and Woodland
	Ouachita Pine/Bluestem Woodland and Guild Habitat
	Ouachita Pine-Oak Forest
	Ouachita Riparian
	Central Interior Acidic Cliff and Talus
	Shrubland Guild Habitat
<i>Stenotrema pilsbryi</i> Rich Mountain Slitmouth	
Weighted Viability Score*: 2 - Fair S Rank: S2/- (AR/OK) G Rank: G2	
Comments: Nine of the 10 known sites are located on the Ouachita National Forest, in areas that are protected by laws from logging or other high use impacts. It is known from numerous locations associated with rock glaciers usually above the 1600 ft. contour, and usually under hardwood forest cover, on Rich and Black Fork Mountains in AR & OK, and on Winding Stair Mtn., OK. There are no major threats to any of the populations. However, there are some activities that could conceivably impact snail habitat, including mowing, paving and repaving of the Talimena Scenic Drive, maintenance of vistas involving periodic localized vegetation management, and maintenance of hiking trails, electronic transmission sites, and one power line right-of way. Population trends are assumed to be stable (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Robison & Allen 1995, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999, USDI FWS 2001).	
Associated Conservation Target	Central Interior Acidic Cliff and Talus
<i>Stenotrema unciferum</i> Ouachita Slitmouth	
Weighted Viability Score*: 2.67 - Good S Rank: S?/- (AR/OK) G Rank: G2	
Comments: Highly localized populations, but very common within the site. Found to occur on moist slopes in rotting timbers, but most particularly under small talus (Brian Coles, pers. Comm.). Known to occur in Montgomery and Polk counties in the Ouachita NF (ANHI 2003, NatureServe 2003, Robison & Allen 1995).	
Associated Conservation Target	Ouachita Mesic Hardwood Forest and Guild Habitat
Taxa: Mammal	
<i>Corynorhinus rafinesquii</i> Rafinesque's Big-Eared Bat	
Weighted Viability Score*: 4 - Very Good S Rank: S2/- (AR/OK) G Rank: G3G4	
Comments: Viability concerns on NF limited to the Tiak RD on the Ouachita NF & Ozark NF-St. Francis (ANHI 2003, Baker and Ward 1967, Black 1936, Bunch, Dye 1998, Crump 2003, Crump 2003A, 2003C, 2003D, 2003H, Elliot 1994, Gardner and McDaniel 1978, Gardner 1978, Gardner 1978a, Graves and Harvey 1974, Heath et al. 1983, Heidt et al. 1987, Hoffmeister and Goodpaster 1962, Hurst and Lacki 1999, Kiser and Elliot 1996, McAllister et al. 1995, McDaniel and Gardner 1977, Mumford and Cope 1964, NatureServe 2003, NatureServe 2003a, Nelson et al. 1991, Odegard 2003, ONHI 2003: Penor et al. 1996, Pitts et al. 1996, Saugey et al. 1993, Sealander 1956, Sealander and Heidt 1990, Steward 1988, Steward 1986, Tumblison 1995).	
Associated Conservation Targets	Large Diameter Hollow Trees
	South-Central Interior Large Floodplain
	Snags
<i>Myotis austroriparius</i> Southeastern Myotis	
Weighted Viability Score*: 3.36 - Very Good S Rank: S2?/S2? (AR/OK) G Rank: G3G4	
Comments: Peripheral to the Ouachita Mtns. Known from SE OK (ANHI 2003, Askins 2001, Baker 1994, Baker and Ward 1967, BCI 2001, Benz and others 1997, Black 1936, Bozeman 1936, Clark and others 1987, Crump 2003, Crump 2003A, 2003B, 2003C, 2003D, 2003H, 2003J, 2003K, 2003M, 2003N, Davis and others 1955, Dillinger and Black 1940, Dickson and others 1983, Ford and others 2002, Foster and others 1978, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Graves and Harvey 1974, Gregory and others 1991, Guyette and Spetich 2003, Harvey 1975, 1991, 1991a, 1996, 1997, Harvey and Clark 1997, Harvey and others 1991, Heath and others 1983, 1986, Heidt and others 1987, 1996, Hofmann and others 1999, LaVal 1970, Litvaitis 2001, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, McAllister and others 1995, McDaniel and Gardner 1977, Mumford and Cope 1964, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, ONHI 2003, Reed 2004, Saugey and others 1993, Saugey 1989, Sealander 1956, Sealander and Heidt 1990, Steward 1988, Steward 1986, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).	
Associated Conservation Targets	Caves, Mines & Karst Habitat
	Large Diameter Hollow Trees
	Large Trees near Water
	Ouachita Ponds, Lakes and Water Holes

	Ouachita Riparian
	Ouachita Rivers and Streams
	Snags
	South-Central Interior Large Floodplain
<i>Myotis leibii</i> Eastern Small-Footed Bat	
Weighted Viability Score*: 3.31 - Very Good S Rank: S1/- (AR/OK) G Rank: G3	
Comments: Two known localities in the Ouachita Mtns.-one from the city of Mena & one from Bear Den Cave. Ozark localities include several caves, utilized primarily as hibernacula (ANHI 2003, Askins 2001, Baker 1994, BCI 2001, Black 1936, Bozeman 1936, Caire and others 1979, Clark and others 1987, Crump 2003, Crump 2003A, 2003B, 2003C, 2003D, 2003H, 2003J, 2003K, 2003M, 2003N, Davis and others 1955, Dillinger and Black 1940, Dickson and others 1983, Erdle and Hobson 2001, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Harvey 1975, 1991, 1991a, 1996, 1997, Harvey and Clark 1997, Harvey and others 1991, Heath and others 1983, 1986, Heidt and others 1987, 1996, Jurney and others 2001, Law and others 1994, LaVal and LaVal 1980, Litvaitis 2001, Masters 1991, Masters and others 1995, Masters and Wilson 1994, McDaniel and Gardner 1977, McDaniel and others 1982, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, ONHI 2003, Pitts and others 1996, Reed 2004, Saugey and others 1993, Saugey and others 1989, Sealander 1967, Sealander and Heidt 1990, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999, Wilhide and others 1998).	
Associated Conservation Targets	Bear Den Cave
	Central Interior Cliff and Talus
	Caves, Mines & Karst Habitat
	Ouachita Ponds, Lakes and Water Holes
	Ouachita Rivers and Streams
	Ouachita Dry Oak Woodland
	Ouachita Mesic Hardwood Forest and Guild Habitat
<i>Myotis sodalis</i> Indiana Bat	
Weighted Viability Score*: 2.86 - Good S Rank: S2/S1 (AR/OK) G Rank: G2	
Comments: Federally & State Endangered species. Ozark caves serve as hibernacula. No known maternity sites in Arkansas. One Ouachita locality in Bear Den Cave on the west end of Rich Mtn. In OK serves as an occasional hibernaculum (ANHI 2003, Baker and Ward 1967, Benz and others 1997, Black 1936, Black 1934, Brack and LaVal 1985, Brack 1983, Brady 1983, Britzke and others 2003, Callahan 1993, Callahan et al 1997, Carter 2003, Clark and others 1987, Clark and others 1987a, Clark 1981, Clark and Harvey 1997, Clark and Harvey 1996, Clark and Harvey 1986, Cope and Humphrey 1977, Cope and others 1973, Cope and others 1991, Crump 2003, Crump 2003A, 2003C, 2003D, 2003H, Engel 1976, Fletcher 1985, Foster and others 1978, Gardner 1987, Gardner and others 1996, Gardner and others 1991, Gardner and others 1989, Gardner and others 1990, Gardner and Garner 1990, Graening and others 2001, Graves and Harvey 1974, Guthrie 1933, Hall 1962, Harvey 1975, Harvey 1991, Harvey 1984, Harvey 1987, Harvey 1996, Harvey 1997, Harvey 1975a, Harvey 1991, Harvey 1994, Harvey 1980, Harvey 1991, Harvey 1980, Harvey and Clark 1997, Harvey and others 1979, Harvey and others 1991, Harvey and McDaniel 1986, Heidt and others 1996, Heidt and others 1987, Humphrey 1978, Humphrey and others 1977, Humphrey and Cope 1977, Johnson and others 1998, Kiser and Elliot 1996, Kurta and others 1992, Kurta and others 1993, Kurta and Kennedy 2002, LaVal and LaVal 1980, MacGregor and others 1999, Martin 2001, Martin and others 2000, McDaniel and Gardner 1977, Menzel and others 2001, Mumford and Cope 1964, Myers 1964, NatureServe 2003, NatureServe 2003a, Odegard 2003, ONHI 2003, Pitts and others 1996, Saugey and others 1989, Sealander 1956, Sealander 1960, Sealander and Heidt 1990, Sealander and Young 1955, Steward 1988, Thomson 1982, Tumlinson 2001, Wilhide and others 1998, Wilhide and others 1998a).	
Associated Conservation Targets	Bear Den Cave
	Caves, Mines & Karst Habitat
	Large Diameter Hollow Trees
	Large Trees near Water
	Ouachita Dry Oak Woodland
	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Ponds, Lakes and Water Holes
	Ouachita Riparian
	Ouachita Rivers and Streams
	Snags
<i>Spilogale putorius interrupta</i> Plains Spotted Skunk	
Weighted Viability Score*: 2.55 - Good S Rank: S?/- (AR/OK) G Rank: G5T4	
Comments: Distributed FS-wide. Uncommon, possibly declining (ANHI 2003, Bukenhofer and Hedrick 1997, Bukenhofer and others 1994, Crump 2003, Crump 2003A, 2003C, 2003D, 2003H, Foti and Glenn 1991, Guldin and others 2004, Heidt and others 1996, Heubschmann and others 2000, Liechty and others 2005, Lochmiller and others 1993, Luckow 2000, Masters and others 1993, 1998, NatureServe 2003, NatureServe 2003a, Odegard 2003, ONHI 2003, Peck and others 1985, Perry In Process, Sealander 1956, Sealander and Heidt 1990, Smith and Neal 1991, Sparks 1996, Sparks and others 2002, Steward 1988).	
Associated Conservation Targets	Ouachita Dry Oak Woodland
	Oak Woodlands Guild Habitat
	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat

	Ouachita Pine-Oak Forest
	Ouachita Pine-Oak Woodland
	Ouachita Pine/Bluestem Woodland and Guild Habitat

Taxa: Plant

<i>Amorpha ouachitensis</i>		Ouachita Leadplant or False Indigo	
Weighted Viability Score*: 2.5 - Fair		S Rank: S3/S2 (AR/OK)	G Rank: G3Q
<p>Comments: This plant species is endemic to the Ouachita Mtns. and Ozark Mountains. Restricted distribution. This species is found in riparian areas and gravel bars along perennial streams and in some instances on moist ridges (Rich Mountain) and occasionally in oak-pine Forests. There are 33 locations on the Ouachita National Forest in Arkansas and Oklahoma. Those sites located along drainages are protected through the implementation of ALRMP standards for protection of SMAs. The majority (90 %) of the sites on the Ouachita NF are within riparian habitat. (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Jurney and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999, USDI FWS 1980, 1999, Wilbur 1975).</p>			
Associated Conservation Targets	Ouachita Mesic Hardwood Forest and Guild Habitat		
	Ouachita Pine-Oak Forest		
	Ouachita Riparian		
<i>Calamovilfa arcuata</i>		A Sandgrass	
Weighted Viability Score*: 3.5 - Very Good		S Rank: S1/S2 (AR/OK)	G Rank: G2
<p>Comments: Scattered populations of Cumberland sandreed, <i>Calamovilfa arcuata</i>, occur within the western portion of the Ouachita Mtns. This species has been found in Arkansas along the Cossatot and Fourche LaFave Rivers, and in McCurtain and LeFlore Counties in Oklahoma along the Mountain Fork and Glover Rivers. There are nine sites near or adjacent to lands in FS ownership in Oklahoma and Arkansas. It's a perennial grass, which grows in full sun on sand and gravel bars, riverbanks, and mid-stream islands. Stream size varies from intermittent creeks to permanently flowing rivers but the substrate is always a damp, well-mixed assortment of sands, gravels, and organic material. Populations are probably dependent on periodic floods, which eliminate other vegetation and form new, suitable habitat. This species is protected through the implementation of ALRMP standards and guides for protection of SMAs (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Jurney and others 2001, Law and others 1994, Logan 1997, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).</p>			
Associated Conservation Target	Ouachita Rivers and Streams		
<i>Callirhoe bushii</i>		Bush's Poppymallow	
Weighted Viability Score*: 2.67 - Good		S Rank: S3/- (AR/OK)	G Rank: G3
<p>Comments: It is unlikely that this species would be found in the Ouachita Mountains (Conversation with Gary Tucker 8-28-01), but it may possibly occur on the Tiak RD in the limestone glade areas. This fire-dependent species (personal comm. Doug Zollner-TNC) has been found in three locations in McCurtain County Oklahoma (OK) and 12 in Arkansas (AR). None of the AR locations occur within and only one OK site (T7SR26E Sec 15) occurs near the Ouachita NF. In AR, this species is found in rocky open woods, along the borders of limestone glades, roadsides and fencerows at elevations of 300-390 m. In OK, habitat includes open woods, lowland, floodplains, wet prairie and shaded creek banks in typically loam, sandy loam or alluvium soils. Loss of the natural fire regime is the greatest current threat to the species as a whole. The encroachment of woody vegetation into occupied habitat can change the amount of available sunlight and moisture, making sites less suitable for populations. Although populations persist in mid-successional habitats (moderately open woodlands and edges of glades), complete canopy closure is believed to eliminate this species from the open woodlands (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Jurney and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).</p>			
Associated Conservation Targets	Oak Woodlands Guild Habitat		
	Ouachita Dry Oak Woodland		
<i>Carex latebracteata</i>		Waterfall's Sedge	
Weighted Viability Score*: 2.5 - Fair		S Rank: S3/S2 (AR/OK)	G Rank: G3

Comments: This species is a locally abundant endemic to the Ouachita Mtns. with 75 locations near or on the Ouachita NF. It is found in a variety of habitats such as shaley roadsides, dry shale woodlands, riparian areas, mesic oak hickory forest, pine and pine hardwood forest, and shale and novaculite glades. It is found in Polk, Yell, Montgomery, Howard, Garland and Pike Counties in AR and Leflore and McCurtain Counties in OK. Waterfall's Sedge receives some natural protection from human disturbance by the diversity of its preferred habitats, and many of the NF locations are on sites that are outside the normal operating limits of common land management activities, such as within protected sites in glade and riparian communities, Wilderness Areas, and Research Natural Areas. There are also thriving populations within areas that have had timber management activities and prescribed fire in the past. A minor risk to the species occurs from the use of herbicides to control vegetation where it occurs adjacent to roadways. It does not appear subject to extensive plant collecting for scientific or ornamental purposes (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Targets	Central Interior Highlands Dry Acidic Glade and Barrens
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Novaculite Glade and Woodland
	Ouachita Pine-Oak Forest
	Ouachita Riparian

Castanea pumila* var *ozarkensis

Ozark Chinquapin

Weighted Viability Score*: 2.5 - Fair

S Rank: S3S4/S2 (AR/OK)

G Rank: G5T3

Comments: The fire-dependent species (personal comm. Doug Zollner-TNC) Ozark chinquapin is listed as sensitive because throughout its natural range continued existence is threatened by the chestnut blight. Despite its status, it is both abundant and of widespread distribution throughout the Interior Highlands. It is found in both successional and old-growth vegetation types commonly occurring in dry deciduous and mixed hardwood pine communities on rocky dry slopes and ridge tops. It occurs largely as stump sprouts and it reaches its fastest growth rate where abundant sunlight reaches the forest floor (Tucker, 1989). Direct impacts to Ozark chinquapin individuals may result from herbicide treatments and/or any activity removing existing vegetation by uprooting it or burying existing plants and seeds. Road and pond construction are possibly the most detrimental direct impacts to the chinquapin (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Dave and others 1999, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Johnson 1988, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Paillet 1993, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, Tucker 1989, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Targets	Central Interior Cliff and Talus
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Dry Oak Woodland
	Ouachita Dry-Mesic Oak Forest
	Ouachita Pine-Oak Forest

Cypripedium kentuckiense

Southern Lady's-Slipper

Weighted Viability Score*: 2.5 - Fair

S Rank: S3/S1 (AR/OK)

G Rank: G3

Comments: This species is found within the Interior Highlands of Arkansas, Missouri, and Oklahoma, the Gulf Coastal Plain of Texas, Louisiana, Alabama and Mississippi and the Cumberland Plateau of Kentucky and northern Tennessee. It has also recently been found in eastern Virginia. *Cypripedium kentuckiense* has been recorded for Pulaski, Lincoln, Sevier, Crawford, Franklin, Montgomery, Garland, Polk, Johnson, Jefferson, Hempstead, Pery, Grant, Madison, Howard, and Pike Counties in Arkansas. It is also known from McCurtain, LeFlore, Choctaw and Pushmataha Counties of Oklahoma. There are 88 known sites for this species on the Ouachita NF (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2000, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Target	Ouachita Mountain Forested Seep
	Ouachita Riparian

Delphinium newtonianum

Moore's Larkspur

Weighted Viability Score*: 3.08 - Good

S Rank: S3/- (AR/OK)

G Rank: G3

Comments: *Newton's larkspur, *Delphinium newtonianum*, G3. This species is endemic to the Interior Highlands of Arkansas, and is locally abundant in a narrow region. It is found in 12 sites (nine on the Caddo RD) within Pike and Montgomery County in the Ouachita Mountains. This species commonly occurs in the shade of moist deciduous or mixed hardwood-pine communities, primarily within seep/springs and rocky stream terraces. It is generally found in forest with relatively clean understory and with a low herbaceous cover but high species diversity among the associated species. Moore's delphinium "prefers light to heavy shade of hardwoods, a moist loamy clay or sandy clay loam". Newton's larkspur appears to be favored on sites that are moist and shaded. The populations with the highest densities are those stands, which have been thinned. The weaker populations are those in stands with the least amount of disturbance. Excessively heavy thinning however opens the forest to invasion by opportunistic species and dries out the soil, making the habitat unsuitable for this species (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hardcastle 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Robison and Allen 1995, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, Tucker 1989a, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Targets	Ouachita Mesic Hardwood Forest and Guild Habitat
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	Ouachita Riparian
	Ouachita Mountain Forested Seep
<i>Draba aprica</i>	Open-ground Whitlow-grass
Weighted Viability Score*: 2 - Fair	S Rank: S2/S1 (AR/OK) G Rank: G3
<p>Comments: Open-ground draba, <i>Draba aprica</i>, is found in the Ouachita Mountains along shale, sandstone and limestone bluffs and glades. There are fourteen locations within the Ouachita NF on or near the Oden, Womble, Jessieville/Winona and Tiak RDs. Most populations consist of one to several small patches of only a few square meters each. Those confined to a single patch generally consist of less than 100 plants. <i>Draba aprica</i> is a winter annual, which germinates in late fall and forms a basal rosette of leaves which over winters and sends up a flowering stem with the advent of warmer weather in early spring. There are drastic fluctuations in the populations of annuals species. This fluctuation makes it hard to monitor this species annually. Generally, the soil in most places where <i>Draba aprica</i> grows is too thin to support a continuous cover of large trees, and it is exposed to at least partial sun. Since it is found in somewhat open areas, <i>Draba aprica</i> is well adapted to vegetation types that are successional in nature. This is due to the generally more open canopy and more frequent canopy gaps resulting from rapid tree death in these communities. Most populations of <i>Draba aprica</i> consist of one to several small patches of only a few square meters each. Those confined to a single patch generally consist of less than 100 plants. This species is found on shallow soils in areas where there is little vegetative competition (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999). Personal comm. with Doug Zollner identified this species as being fire dependent (Fire dependent – Species populations increase with fire management. Species occurs within habitats/ecosystems where fire is a primary ecological process. Species populations decline without fire management). This species would benefit from prescribe fire through the reduction of competing vegetation.</p>	
Associated Conservation Target	Central Interior Highlands Dry Acidic Glade and Barrens
<i>Dryopteris x australis</i>	Dryopteris
Weighted Viability Score*: 2.5 - Fair	S Rank: S1/- (AR/OK) G Rank: HYB
<p>Comments: Small's woodfern, <i>Dryopteris x australis</i> (HYB) is a hybrid between <i>Dryopteris celsa</i> and <i>D. ludoviciana</i>. It occurs across the southeastern United States. It is known from four locations in Garland and Montgomery counties with only two on the Caddo and Womble RDs. The habitat for this species is gravelly springs and seeps. This hybrid is available commercially from nurseries. The taxonomy is also questionable (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).</p>	
Associated Conservation Targets	Ouachita Riparian Ouachita Mountain Forested Seep
<i>Eleocharis wolfii</i>	Wolf Spikerush
Weighted Viability Score*: 2.67 - Good	S Rank: S2/- (AR/OK) G Rank: G3?
<p>Comments: *Wolf Spikerush, <i>Eleocharis wolfii</i>, G3?. This species has a wide range, but apparently rare throughout much of its northern range. It is poorly known and may be overlooked. This species is found in open sunny habitats that retain moisture for most of the year. They are associated with wet depressions and seepage areas within sandstone and shale glades. There is one known location on the Ouachita NF in a shale glade and two locations within sandstone glades on the Ozark NF. Habitat and site locations are based on personal communications with Theo Witsell (ANHI) and NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: July 18, 2003).</p>	
Associated Conservation Targets	Central Interior Highlands Dry Acidic Glade and Barrens
<i>Eriocaulon kornickianum</i>	Small-headed Pipewort
Weighted Viability Score*: 2.67 - Good	S Rank: S2/- (AR/OK) G Rank: G2
<p>Comments: *Gulf pipewort, <i>Eriocaulon koernickianum</i>, G2. This species in the western part of its range (Arkansas, Oklahoma, and Texas) it is found in small microhabitats in or near permanently moist to wet seepage areas (particularly upland sandstone glade seeps), bogs, and prairie streambanks. There is only one location known to occur on the Ouachita NF and that is on the Fulton Branch Glades on the Womble RD. In 1994 survey, less than 10 plants were counted. No plants were found in 2001 or 1999 survey. Population described as small and of poor quality (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).</p>	
Associated Conservation Targets	Central Interior Highlands Dry Acidic Glade and Barrens
<i>Helianthus occidentalis ssp</i>	Shinnery's Sunflower
Weighted Viability Score*: 2.5 - Fair	S Rank: S1/- (AR/OK) G Rank: G5T2T3Q

Comments: This species occurs in Arkansas, Louisiana and Texas. The only known sites for the Ouachita NF are on the Womble and Jessieville/Winona RD. All three sites occur within associations of shortleaf pine-oaks-hickory forest and in one instance in an abandoned stream channel. This plant forms dense stoloniferous colonies. It prefers full sunlight in areas with some disturbance and low competition (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Marsh and Golden 1996, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Targets	Central Interior Highlands Dry Acidic Glade and Barrens
	Ouachita Pine-Oak Forest
	Ouachita Rivers and Streams

***Houstonia ouachitana* Ouachita Bluet**

Weighted Viability Score*: 2.67 - Good S Rank: S3/S1 (AR/OK) G Rank: G3

Comments: Ouachita bluet, *Houstonia ouachitana*, G3. This species is considered to be a Ouachita Mountain endemic. It occurs in a variety of habitats from rocky open woods to shaded mesic hardwood forests. This includes oak-hickory-pine forest, riparian areas, talus slopes and rocky areas along streambanks, and glades. There are 70 sites for this species on the Ouachita NF. Habitat information is based on descriptions in site records from ONHI database (2003) and ANHI database (2003). Ouachita NF site locations are based on records from ONHI database (2003) and ANHI database (2003).

Associated Conservation Targets	Central Interior Acidic Cliff and Talus
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Riparian

***Hydrophyllum brownei* Browne's Waterleaf**

Weighted Viability Score*: 2.58 - Good S Rank: S1/- (AR/OK) G Rank: G1

Comments: Brown's waterleaf, *Hydrophyllum brownei*, is endemic to the Ouachita Mountains of Arkansas. There are 10 known locations within or near the Ouachita NF. It has been reported near or on the Caddo, Womble and Mena RDs. Primary habitat preferences for this species are moist, species-rich floodplain terraces along perennial streams. It is a shade dependent species and thinning of the canopy or canopy removal could be detrimental to this species (Conversation with Gary Tucker). This species normally occurs in areas such as the SMA that are not subject to timber management activities. It occasionally will occur along a lower slope outside the SMA. The majority of the populations should be protected through the implementation of ALRMP standards and guides for protection of SMAs. There is no information on the effects of fire on this species. It does have thick fleshy roots, which may provide some protection from fire (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, FTN 2001, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Kral 1983, Kral and Bates 1991, Law and others 1994, Marsico 2004, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Targets	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Riparian

***Juglans cinerea* Butternut**

Weighted Viability Score*: 2.67 - Good S Rank: S3/- (AR/OK) G Rank: G3G4

Comments: There are more than 100 occurrences from at least 17 states within the range of this species; however, the abundance and condition are both in rapid decline due to butternut canker disease, with no known remedy. High mortality, higher rates of infection and rapid loss of the remaining uninfected trees to timber cutting are factors. There is one verified location of butternut on the Ouachita NF in the Caney Creek Wilderness and one undocumented report on the Jessieville RD (USDA Forest Service 1991). Butternut typically grows in rich mesophytic forests, lower slopes, ravines, and various types of bottomland, including banks and terraces of creeks and streams, and floodplain forests (MA 6-Mesic Hardwood). This species achieves its best growth in well-drained bottomland and floodplain soils. The major threat throughout its entire range is susceptibility to the butternut canker disease. The fungus disrupts nutrient flow through cambium areas, which is generally fatal. It may take trees more than 40 years to die, but in many cases, death has rapidly followed infection. Following dieback, this species does not leave live root sprouts and usually does not leave viable seed. Butternut is shade-intolerant, achieving its best growth in full sunlight and requires some form of disturbance, such as soil disturbance and the creation of canopy gaps for successful reproduction and establishment (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Targets	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Riparian

***Leavenworthia aurea* Golden Glade Cress**

Weighted Viability Score*: 3.5 - Very Good S Rank: -/S2 (AR/OK) G Rank: G2

Comments: On the Ouachita NF known only from the Tiak RD. Golden glade cress, *Leavenworthia aurea*, is known as two varieties from two counties in southeastern Oklahoma and two counties from eastern Texas. *Leavenworthia aurea* var. *aurea* is an Oklahoma endemic with twenty-six known populations, all concentrated in the extreme southeastern corner of the state. The populations generally have thousands of individuals that together form an almost linear population stretching for about 100 km along a narrow band of Cretaceous limestone from McCurtain to Choctaw Counties. There are five locations within the proclamation boundary of the Ouachita NF on the Tiak RD (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Target	Southern Arkansas Calcareous Prairie	
<i>Lesquerella angustifolia</i>	Threadleaf Bladderpod	
Weighted Viability Score*: 3.5 - Very Good	S Rank: -/S3 (AR/OK)	G Rank: G3
Comments: Threadleaf bladderpod, <i>Lesquerella angustifolia</i> , is found on limestone soils in extreme northeast Texas and southeastern Oklahoma. There are two locations of this species near or on the Ouachita NF is on the Tiak RD. It is found in the limestone glades in McCurtain County (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).		
Associated Conservation Target	Southern Arkansas Calcareous Prairie	
<i>Parnassia grandifolia</i>	Large-leaved Grass-of-Parnassus	
Weighted Viability Score*: 2.5 - Fair	S Rank: S3/- (AR/OK)	G Rank: G3
Comments: Grass-of-Parnassus, <i>Parnassia grandifolia</i> , G3. This species has a moderately wide but sparse range throughout much of the South. This species is considered secure within the Ozark Mountains but disjunct within the Ouachita Mountains. The ANHI currently tracks only those locations within the Ouachita Mountain region. There is one location on the Ouachita NF in Twin Creek seep. The habitat for this site is a seepage area along a streambank. These habitats are protected through the implementation of ALRMP standards and guides for protection of SMZs. Habitat base on information is based on descriptions of site records from ANHI database (2003). Ouachita NF site information is based on site records from ONHI database (2003) and ANHI database (2003).		
Associated Conservation Target	Ouachita Mountain Forested Seep	
<i>Polymnia cossatotensis</i>	Heartleaf Leafcup	
Weighted Viability Score*: 2.5 - Fair	S Rank: S1/- (AR/OK)	G Rank: G1
Comments: Cossatot Mountain leafcup, <i>Polymnia cossatotensis</i> , is a Ouachita Mountain endemic. There are only four known locations and all occur on the Ouachita NF. The sites include Winding Stairs, Brush Heap Mountain, Gap Mountain and Pryor Mountain. The leafcup is found in open areas on a cherty novaculite talus slope, often growing with roots directly attached to bare rock surfaces. The location on Gap Mountain was found in area following a dormant season prescribed burn. Because it is found to occur on loose talus, it is not in area of merchantable timber. Habitat base on information is based on descriptions of site records from ONHI database (2003) and ANHI database (2003). Ouachita NF site information is based on site records from ONHI database (2003), ANHI database (2003), information provided by Edith Hardcastle and David Williams at the University of Arkansas at Fayetteville, and Pittman, Albert B. and others 1989. A new species of <i>Polymnia</i> (Compositae: Heliantheae) from the Ouachita Mountain region of Arkansas. Sida 13(4): 481-486. (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hardcastle and others 1989, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).		
Associated Conservation Target	Ouachita Novaculite Glade and Woodland	
<i>Quercus acerifolia</i>	Maple-leaved Oak	
Weighted Viability Score*: 2 - Fair	S Rank: S1/- (AR/OK)	G Rank: G1
Comments: Mapleleaf oak, <i>Quercus acerifolia</i> , G1. This species occurs on Magazine Mountain and in the Ouachita Mountains in Arkansas and Oklahoma. It is found in Logan, Polk, Montgomery and Sebastian Counties. There are two locations on the Ouachita NF. These sites are on Pryor and Porter Mountains on the Caddo RD. The sites on the Ozark-St. Francis and Ouachita NF are found on novaculite slopes in open woods, ledges, cliff edges and on steep ridges. This species is a small, shrubby deciduous tree, (typically 3-9 m tall) with broad, palmately lobed leaves that resemble those of a maple. The leaves turn scarlet-red in the fall. Ouachita NF site information is based site records from ANHI database (2003) and USDA Forest Service. 1991. Baseline Vegetation Inventory Study Caney Creek Wildemess Area (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).		
Associated Conservation Target	Central Interior Acidic Cliff and Talus	
	Central Interior Highlands Dry Acidic Glade and Barrens	
<i>Solidago ouachitensis</i>	A Goldenrod	
Weighted Viability Score*: 2.53 - Good	S Rank: S3/S1 (AR/OK)	G Rank: G3
Comments: Ouachita Mountain goldenrod, <i>Solidago ouachitensis</i> , is endemic to the Ouachita Mountains of Arkansas and Oklahoma and is known from 30 locations on the Ouachita NF. The goldenrod is found in mesic oak-hickory forests on north-facing slopes and occasionally within riparian areas in the Central Ouachita Mountains. It is known to occur in Polk, Yell, Montgomery and Pike Counties in Arkansas and LeFlore County in Oklahoma (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).		
Associated Conservation Targets	Ouachita Riparian	

	Ouachita Dry-Mesic Oak Forest
	Ouachita Mesic Hardwood Forest and Guild Habitat
<i>Streptanthus squamiformis</i>	A Twistflower
Weighted Viability Score*: 2.21 - Fair	S Rank: S2/S1 (AR/OK) G Rank: G2
Comments: Twistflower, <i>Streptanthus squamiformis</i> , is endemic to the Ouachita NF. Cyclic annual abundance according to natural disturbance regimes. This species is known from about 28 locations in Oklahoma and Arkansas. There are 20 documented locations within the Ouachita NF but three sites have a possible misidentification. This species is only found on the Mena RD and in the acquired lands in McCurtain County Oklahoma within the Ouachita NF. It can be found in openings in mesic hardwood forests, roadside ditches, novaculite glades sometimes associated with slopes and ravines adjacent to small streams (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).	
Associated Conservation Targets	Ouachita Novaculite Glade and Woodland
	Grass/Forb Guild Habitat
	Ouachita Dry-Mesic Oak Forest
<i>Thalictrum arkansanum</i>	Arkansas Meadow-Rue
Weighted Viability Score*: 3.5 - Very Good	S Rank: -/S1 (AR/OK) G Rank: G2Q
Comments: This species is rare in northeastern Texas and adjacent, uplifted areas of eastern Oklahoma and southwestern Arkansas (plus one disjunct locale in eastern Arkansas). There are only four known locations for this species on the Ouachita NF all on the Tiak RD. The habitat can be described as the low moist woods adjacent to the limestone glades (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).	
Associated Conservation Target	Southern Arkansas Calcareous Prairie
<i>Tradescantia ozarkana</i>	Ozark Spiderwort
Weighted Viability Score*: 2.67 - Good	S Rank: S3/S1S2 (AR/OK) G Rank: G3
Comments: Ozark spiderwort, <i>Tradescantia ozarkana</i> , G3. This species is endemic to the Ozark Mountains of Missouri, Oklahoma, and Arkansas and the Ouachita Mountains of western Arkansas and southeastern Oklahoma. There are fifteen extant populations in Missouri, more than that in Arkansas, and a few in Oklahoma (NatureServe: An online encyclopedia of life [web application], 2003). There are 11 locations on or near the Ouachita NF this species is known only from Blackfork and Rich Mountains and the Broken Bow Unit.	
Associated Conservation Targets	Central Interior Cliff and Talus
	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Riparian
<i>Trillium pusillum var ozarkanum</i>	Ozark Least Trillium
Weighted Viability Score*: 2.47 - Fair	S Rank: S3/S1 (AR/OK) G Rank: G3T3
Comments: This species is endemic to the Ozark Mountains of Missouri, Oklahoma, and Arkansas and the Ouachita Mountains of western Arkansas and southeastern Oklahoma. There are fifteen extant populations in Missouri, more than that in Arkansas, and a few in Oklahoma. There are 11 locations on or near the Ouachita NF; this species is known only from Blackfork and Rich Mountains and the Broken Bow Unit. <i>Tradescantia ozarkana</i> does not appear to be highly habitat-specific. Throughout its range, it has been recorded from rich, diverse, mesic deciduous forest. Herbaceous associates are not well-known. <i>Asclepias quadrifolia</i> , <i>Carex latebracteata</i> , <i>Dodecatheon meadia</i> , <i>Hedyotis ouachitana</i> , <i>Silene virginica</i> , and <i>Tradescantia ohiensis</i> are associates at a McCurtain County, Oklahoma site. Thinning of the canopy may be beneficial for this species as "dense shading seems to be associated with smaller populations." There may be circumstances under a full canopy such as a maturing second-growth woodland where limited canopy removal may be of use, but in general if left alone in forested habitat, windthrow and mortality may provide adequate canopy opening to sustain populations (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).	
Associated Conservation Targets	Ouachita Mesic Hardwood Forest and Guild Habitat
	Ouachita Dry Oak Woodland
	Ouachita Dry-Mesic Oak Forest
	Ouachita Riparian
<i>Valerianella nuttallii</i>	Nuttall's Corn-Salad
Weighted Viability Score*: 2 - Fair	S Rank: S1/- (AR/OK) G Rank: G1G2

Comments: This species is apparently restricted to western Arkansas. It was formerly reported in eastern Oklahoma; however, occurrences have not been confirmed there recently. This species is found in Garland, Hot Spring, Logan and Polk counties in Arkansas. There are only two locations known within the Ouachita NF; there is also one site near the Cold Springs RD near the Boy Scout Camp which has some taxonomic questions. It is found in two distinct habitats. The first is meadows and ditches in association with annuals and perennials including but not limited to *Blephilia ciliata*, *Coreopsis lanceolata*, *Valerianella longiflora*, *V. radiata* and *Daucus carota*. Another habitat is in open areas within shale glades (Wilkes 1999). On the Ouachita NF it is found on shale glades or in roadside ditches adjacent to the shale glades. This species is an annual and prefers areas where vegetation competition is low. Since this species is found in meadows and in roadside ditches, it can be assumed that it can withstand some disturbance and/or that some disturbance may be beneficial (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999, Wilkes 1999).

Associated Conservation Target

Central Interior Highlands Dry Acidic Glade and Barrens

Valerianella palmeri

A (Palmer's) Corn-Salad

Weighted Viability Score*: 2.62 - Good

S Rank: S3/S1 (AR/OK)

G Rank: G3

Comments: Palmer's corn-salad, *Valerianella palmeri*, is an endemic only known from Arkansas and eastern Oklahoma. It is found in Howard, Polk, Garland and Hot Springs Counties in Arkansas, and McCurtain County in Oklahoma. There are three locations on the Ouachita NF in McCurtain County and on the Jessville RD. This plant is an annual that inhabits a variety of sites such as gravelly areas near streams, rocky ledges in open woods and mesic oak woods (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Targets

Ouachita Mountain Forested Seep

Ouachita Riparian

Central Interior Highlands Dry Acidic Glade and Barrens

Ouachita Mesic Hardwood Forest and Guild Habitat

Verbesina walteri

Rayless Crown-Beard

Weighted Viability Score*: 2.67 - Good

S Rank: S1/S1 (AR/OK)

G Rank: G3?

Comments: Rayless crown-beard, *Verbesina walteri*, is primarily a coastal plain species, which occurs as an outlier within the Ouachita Mountains. There are six locations on the Ouachita NF. It is known from the Talimena Scenic Drives, and Queen Wilhelmina State Park and the Blackfork Wilderness. Associated species include but are not limited to white oak, mockernut hickory, basswood, cucumber magnolia in the canopy and persimmon, redbud, witch hazel, spicebush and pawpaw in the understory and shrub layer (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Target

Ouachita Mesic Hardwood Forest and Guild Habitat

Vernonia lettermannii

Narrowleaf Ironweed

Weighted Viability Score*: 3.5 - Very Good

S Rank: S3/S? (AR/OK)

G Rank: G3

Comments: This species is known only from western Arkansas and eastern Oklahoma. This species occurs on gravel bars and rock ledges along 5th order perennial streams within the Ouachita, Cossatot, Fourche LaFave, and Poteau drainages in Arkansas and the Mountain Fork drainage in Oklahoma. This species was first reported to occur within a riparian area within a shale glade. New data and locations show that the habitat for the ironweed is riparian but is not limited to those areas adjacent to shale glades. There are a total of 11 sites on NF lands in Oklahoma and Arkansas. A total of 139 plants were reported to occur on six of the sites. Two site reports identified several clumps. Reports for other sites do not have number of plants listed. These populations are deemed stable because the habitat and locations in which this species occurs is excluded from most management activities. The habitat is in or adjacent to stream channels where it is protected from most NF management activities. The population of this species on the Ouachita NF is thought to be stable (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Target

Ouachita Rivers and Streams

Vitis rupestris

Sand Grape

Weighted Viability Score*: 3.5 - Very Good

S Rank: SR/- (AR/OK)

G Rank: G3

Comments: This species is found along cherty streambeds, rocky banks, and gravel bars that are alternately xeric and inundated. This species has been found on NF lands along Buzzard Creek on the Kiamichi RD, along Buchanan Creek near Steve, Arkansas, on the border of the Fourche and Jessieville RD, and along Wheat Creek on the Oden RD. This species is found within the channels of these streams on gravel bars and is protected through the implementation of ALRMP standards and guides for protection of SMAs. Burning should not have an effect on this species (ANHI 2003, Askins 2001, Baker 1994, Crump 2003, Crump and others 2003A, 2003B, 2003C, 2003D, 2003J, 2003K, 2003M, 2003N, Ford and others 2002, Foti and Guldin 1994, Foti and Bukenhofer 1998, Graham and others 2004, Gregory and others 1991, Guyette and Spetich 2003, Hooks 2003, 2003a, 2003b, 2003c, 2003d, Journey and others 2001, Law and others 1994, Masters 1991, Masters and others 1995, Masters and Wilson 1994, NatureServe 2003, 2003a, ONHI 2003, Pert 2000, Smith and others 1984, Sparks and others 1999, Spetich 2004, TNC 2003, Trani and others 2001, USDA FS 1991, 1997, 1997a, 1999).

Associated Conservation Target

Ouachita Rivers and Streams

Taxa: Reptile

Crotalus atrox

Western Diamondback Rattlesnake

Weighted Viability Score*: 2.4 - Fair

S Rank: -/- (AR/OK)

G Rank: G5

Comments: Difficult to inventory due to rugged habitat. The Ouachita population is at the eastern frontier of its distribution (ANHI 2003, Albritton 1981, Ball 1980, Bonati 1980, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dellinger and Black 1938, Dowling 1957, Ernst 1992, Fitch 1985, Fitch and Pisani 1993, Klauber 1956, Martin 1981, Minton and Minton 1948, Ortenburger 1929, Parker 1947, Perkins 1928, Perkins and Lentz 1932, Schuier and others 1972, Schwardt 1938, Stone 1904, Strecker 1924, Trauth and others 2004, Trauth 1986b, Trauth and Cochran 1992, USDA FS 1999, Vance 1987, Wilson 1995).

Associated Conservation Targets

Central Interior Acidic Cliff and Talus
Oak Woodlands Guild Habitat
Ouachita Dry Oak Woodland
Ouachita Montane Oak Forest
Ouachita Novaculite Glade and Woodland
Ouachita Pine/Bluestem Woodland and Guild Habitat
Ouachita Pine-Oak Woodland
Shrubland Guild Habitat
Grass/Forb Guild Habitat
Central Interior Highlands Dry Acidic Glade and Barrens

Crotalus horridus

Timber Rattlesnake

Weighted Viability Score*: 2.5 - Fair

S Rank: -/- (AR/OK)

G Rank: G4

Comments: Range-wide long-term viability concerns. Viability concerns largely related to mortality due to human contact. The USDI FWS lists the timber rattlesnake as a high priority species or species of concern in need of further study throughout its range. The timber rattlesnake is distributed throughout all regions of Arkansas; as yet, no formal legal protection has been afforded this species. Because communal denning behavior has not been proven to occur for this species in Arkansas, populations have been spared the fate of those associated with dens elsewhere. Mark and recapture studies are continuing in northwestern Arkansas (Steve Beaupre, pers. Comm.) to determine population trends and spatial movements of these snakes (Albritton 1981, Anderson 1965, Ball 1980, Beaupre and Zaidan 2001, Bonati 1980, Brown 1982, Brown 1991, Brown 1993, Conant and Collins 1991, Cundall and Beaupre 2001, Dellinger and Black 1938, Dowling 1957, Ernst and Barbour 1989, Ernst 1992, Fitch 1985, Hardy 1992, Hurter and Strecker 1909, Klauber 1956, Martin 1981, Martin 1992, Martin 1993, McAllister and others 1995h, McAllister and others 1993a, Parker 1947, Perkins 1928, Pisani and others 1973, Schwardt 1938, Schuier and others 1972, Stone 1903, Strecker 1924, Trauth and others 1994, 2004, Trauth and McAllister 1995, Werler and Dixon 2000).

Associated Conservation Targets

Forested-Dry Upland Hardwood & Hardwood/Pine Guild
Grass/Forb Guild Habitat
Oak Woodlands Guild Habitat
Ouachita Dry Oak Woodland
Ouachita Dry-Mesic Oak Forest
Ouachita Montane Oak Forest
Ouachita Novaculite Glade and Woodland
Ouachita Pine-Oak Forest
Ouachita Pine-Oak Woodland
Ouachita Riparian
Shrubland Guild Habitat
West Gulf Coastal Plain Small Stream/River Forest
West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough)
Forested-Dense or Semi-open Pine Guild Habitat
Forested-Bottomland Hardwood Guild Habitat

<i>Crotaphytus collaris</i>		Collared Lizard	
Weighted Viability Score*: 2 - Fair		S Rank: -/- (AR/OK)	G Rank: G5
Comments: Rare and poorly known in the Arkansas/Oklahoma Ouachita's. Scattered Ozark populations obligate to glade habitats. Aggregated mostly within the White River Valley in reservoir-maintained glades, and glade-like habitats within the Springfield Plateau. Some viability related to human collections (pets, scientific collectors, scientific supply houses)(ANHI 2003, Bonati 1980, Crump 2003, Crump and others 2003A, 2003C, 25 June, 27 June, Collins 1991, Conant and Collins 1998, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dellinger and Black 1938, Dowling 1957, Hurter and Strecker 1909, Hutchison and others 1999, McAllister 1980a, McAllister 1983., McAllister 1985b, McAllister and others 1985, McAllister and Trauth 1982, McAllister and Trauth 1985, McGuire 1996, ONHI 2003, Schuier and others 1972, Schwardt 1938, Trauth and others 2004, Trauth 1974, 1978, 1979, 1989a, USDA FS 1999, Wilson 1995).			
Associated Conservation Target	Central Interior Acidic Cliff and Talus		
	Central Interior Highlands Dry Acidic Glade and Barrens		
<i>Eumeces obsoletus</i>		Great Plains Skink	
Weighted Viability Score*: 2.5 - Fair		S Rank:-/- (AR/OK)	G Rank: G5
Comments: Poorly known. One record each from the Ozarks and the Ouachita Mtns. Ouachita locality is disjunct, Ozark locality peripheral (ANHI 2003, Collins 1993, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Fitch 1955, Johnson 1987, Robison and Douglas 1979, Trauth and others 2004, USDA FS 1999, Webb 1970, Wilson 1995).			
Associated Conservation Targets	Ouachita Dry Oak Woodland		
	Ouachita Dry-Mesic Oak Forest		
	Ouachita Pine/Bluestem Woodland and Guild Habitat		
	Ouachita Pine-Oak Woodland		
	Central Interior Highlands Dry Acidic Glade and Barrens		
	Grass/Forb Guild Habitat		
<i>Eumeces septentrionalis obtusirostris</i>		Southern Prairie Skink	
Weighted Viability Score*: 2.29 - Fair		S Rank: S3/- (AR/OK)	G Rank: G5T5
Comments: Peripheral. One record each in the Ozarks-Lee Creek, Ouachita's & AR River Valley in AR. More common in OK (ANHI 2003, Collins 1993, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Johnson 2000, McAllister 1987a, ONHI 2003, Trauth and others 2004, USDA FS 1999, Webb 1970, Wilson 1995).			
Associated Conservation Targets	Ouachita Dry-Mesic Oak Forest		
	Ouachita Pine/Bluestem Woodland and Guild Habitat		
	Ouachita Pine-Oak Forest		
	Ouachita Pine-Oak Woodland		
	Grass/Forb Guild Habitat		
	Ouachita Dry Oak Woodland		
<i>Nerodia cyclopion cyclopion</i>		Mississippi Green Water Snake	
Weighted Viability Score*: 3 - Good		S Rank: S4/- (AR/OK)	G Rank: G5
Comments: Peripheral. Known only from the Little River AR/OK & southern and eastern margins of Ouachita ecoregion (ANHI 2003, Ball 1980, Boundy 1995, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dellinger and Black 1938, Dowling 1957, Dundee and Rossman 1989, Garton and others 1970, Hanebrink and Byrd 1986, Hebrard and Mushinsky 1978, Hurter and Strecker 1909, Kofron 1979b, McAllister and others 1990a, Minton and Minton 1948, Mushinsky and Hebrard 1977, Mushinsky and others 1982, ONHI 2003, Perkins 1928, Schwardt 1938, Tinkle 1959, Trauth and others 2004, Trauth 1990, Trauth and others 1994, 2004, USDA FS 1999, Wilson 1995).			
Associated Conservation Target	West Gulf Coastal Plain Small Stream/River Forest		
<i>Sternotherus carinatus</i>		Razorback Musk Turtle	
Weighted Viability Score*: 3.5 - Very Good		S Rank: S3/- (AR/OK)	G Rank: G5
Comments: Not known from the Ozarks. Ouachita's represent the northernmost extent of this species in AR. Common rangewide (Albritton 1981, ANHI 2003, Ball 1980, Bowler 1977, Crump 2003, Crump and others 2003A, 2003C, 2003D, 2003F, 2003P, Dellinger and Black 1938, Dowling 1957, Iverson 1979a, Killebrew 1982b, Lindeman 1996, Mahmoud 1967, Mahmoud 1968, Mahmoud 1969, Martin 1981, McAllister and others 1994c, Meshaka and others 1988c, Perkins 1928, Schwardt 1938, Taylor 1935, Tinkle 1958a, Trauth and others 2004, USDA FS 1999, Vance 1985, Wilson 1995).			
	Ouachita Rivers and Streams		

Table E.4 Ouachita National Forest Current Condition and Rank of Terrestrial Species' Associated Communities and/or Habitat Elements

Ouachita Pine-Oak Forest		Weighted Viability Score* 2.06 - Fair	
<p>Key Factor Name: Areal Extent Weighted Viability Score* 2.00</p> <p>Key Factor Description: Percent of pine-oak systems in forested condition</p>	<p>Indicator Name: Areal Extent Indicator Value: 71% Indicator Weight: 2 Current Status: Fair Poor Level: <40 or >65 Fair Level: 40-44 Good Level: 45-49 or 61-65 Very Good Level: 50-60</p> <p>Description: Percent of pine-oak systems in forested condition</p>		
<p>Key Factor Name: Canopy Closure Weighted Viability Score* 4.00</p> <p>Key Factor Description: Combination of stem density, basal area and extent of canopy cover, with intermittent closure as ideal (Surrogate for Horizontal Structure).</p>	<p>Indicator Name: Canopy Closure Indicator Value: 97.5 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 70% (BA 60 or greater).</p>		
<p>Key Factor Name: Fire Regime Weighted Viability Score* 1.50</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species</p>	<p>Indicator Name: Fire Frequency Indicator Value: 17.4 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p>		
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 42.4 Indicator Weight: 1 Current Status: Good Poor Level: <20 Fair Level: 20-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>		
<p>Key Factor Name: Remoteness Weighted Viability Score* 1.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 2.33 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>		
<p>Key Factor Name: Vertical Structure Weighted Viability Score* 2.17</p> <p>Key Factor Description: The amounts and arrangement of early seral, immature and mature stands in Ouachita Pine-Oak Forest.</p>	<p>Indicator Name: Late Seral (Immature & Mature Sawtimber) Indicator Value: 68.9 (688,029 of 998,951 acres) Indicator Weight: 2 Current Status: Good Poor Level: <50 or >95 Fair Level: 50-60 or 91-95 Good Level: 60-70 or 81-90 Very Good Level: 70-80</p> <p>Description: Average percent of all known acres of Ouachita Pine-Oak Forest vegetation classification system that are in the mature (sawtimber) condition.</p>		
	<p>Indicator Name: Mid-Seral (Poletimber) Indicator Value: 28.6 (285,597 of 998,951 acres) Indicator Weight: 1 Current Status: Very Good Poor Level: <5 or >45 Fair Level: 5-10 or 40-45 Good Level: 10-15 or 30-40 Very Good Level: 15-30</p> <p>Description: Average percent of all known acres of Ouachita Pine-Oak Forest vegetation classification system that are in the immature (poletimber) condition.</p>		
	<p>Indicator Name: Early Seral (Grass/Forb & Seedling/Sapling) Indicator Value: 2.48 (24,765 of 998,951 acres) Indicator Weight: 3 Current Status: Poor Poor Level: <4 or >20 Fair Level: 4-6 or 15-20 Good Level: 6-7 or 13-14 Very Good Level: 8-12</p> <p>Description: Average percent of all known acres of Ouachita Pine-Oak Forest vegetation classification system that are in regeneration (grass/forb), seedling or non-stocked condition.</p>		
Ouachita Pine-Oak Woodland		Weighted Viability Score* 2.11 - Fair	
<p>Key Factor Name: Areal Extent Weighted Viability Score* 3.00</p> <p>Key Factor Description: Percent of pine-oak systems in or dedicated to restored pine-oak woodland condition.</p>	<p>Indicator Name: Areal Extent Indicator Value: 23.4 Indicator Weight: 2 Current Status: Good Poor Level: <15 or >50 Fair Level: 15-19 or 46-50 Good Level: 20-25 or 41-45 Very Good Level: 25-40</p> <p>Description: Percent of pine-oak systems in or dedicated to restored pine-oak woodland condition.</p>		

<p>Key Factor Name: Canopy Closure Weighted Viability Score* 3.00</p> <p>Key Factor Description: Combination of stem density, basal area and extent of canopy cover, with intermittent closure as ideal (Surrogate for Horizontal Structure).</p>	<p>Indicator Name: Canopy Closure Indicator Value: 67.3 Indicator Weight: 2 Current Status: Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure ranging between 40-80% (BA 40-60).</p>
<p>Key Factor Name: Fire Regime Weighted Viability Score* 1.25</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species.</p>	<p>Indicator Name: Fire Frequency Indicator Value: 3.2 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 3-5 year interval.</p>
<p>Key Factor Name: Percent total herbaceous ground coverage Weighted Viability Score* 2.00</p> <p>Key Factor Description: Average percent total native herbaceous ground cover across all known potential occurrences. Density must be sufficient to carry growing season fire at least once every five years. Composition should include only native species.</p>	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 23.8 Indicator Weight: 1 Current Status: Fair Poor Level: 0-20 Fair Level: 21-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
<p>Key Factor Name: Percent total herbaceous ground coverage Weighted Viability Score* 2.00</p> <p>Key Factor Description: Average percent total native herbaceous ground cover across all known potential occurrences. Density must be sufficient to carry growing season fire at least once every five years. Composition should include only native species.</p>	<p>Indicator Name: Percent total herbaceous ground coverage Indicator Value: 32.7 Indicator Weight: 2 Current Status: Fair Poor Level: <25 Fair Level: 25-40 Good Level: 41-75 Very Good Level: >75</p> <p>Description: Average percent total native herbaceous ground cover across all known potential occurrences. Density must be sufficient to carry growing season fire at least once every five years. Composition should include only native species.</p>
<p>Key Factor Name: Remoteness Weighted Viability Score* 2.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 1.89 Indicator Weight: 2 Current Status: Fair Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>Key Factor Name: Vertical Structure Weighted Viability Score* 2.17</p> <p>Key Factor Description: The amounts and arrangement of early seral, immature and mature stands in Ouachita Pine-Oak Woodland.</p>	<p>Indicator Name: Early Seral (Grass/Forb & Seedling/Sapling) Indicator Value: 0 (0 of 255,392 acres) Indicator Weight: 3 Current Status: Poor Poor Level: <4 or >20 Fair Level: 4-6 or 15-20 Good Level: 6-7 or 13-14 Very Good Level: 8-12</p> <p>Description: Young trees with herbaceous groundcover. Average percent of all known acres of Ouachita Pine-Oak Woodland vegetation classification system that are in regeneration (grass/forb), seedling or non-stocked condition.</p>
	<p>Indicator Name: Mid-Seral (Poletimber) Indicator Value: 18.3 (46,737 of 255,392 acres) Indicator Weight: 1 Current Status: Very Good Poor Level: <5 or >45 Fair Level: 5-10 or 40-45 Good Level: 10-15 or 30-40 Very Good Level: 15-30</p> <p>Description: Mid-seral trees with herbaceous groundcover. Average percent of all known acres of Ouachita Pine-Oak Woodland vegetation classification system that are in the immature (poletimber) condition.</p>
	<p>Indicator Name: Late Seral (Immature & Mature Sawtimber) Indicator Value: 81.7 (208,655 of 255,392 acres) Indicator Weight: 2 Current Status: Good Poor Level: <50 or >95 Fair Level: 50-60 or 91-95 Good Level: 60-70 or 81-90 Very Good Level: 70-80</p> <p>Description: Mature trees with herbaceous groundcover. Average percent of all known acres of Ouachita Pine-Oak Woodland vegetation classification system that are in the mature (sawtimber) condition.</p>

Ouachita Pine/Bluestem Woodland and Guild Habitat		Weighted Viability Score* 2.61 - Good
<p>Key Factor Name: Areal Extent Weighted Viability Score* 3.00</p> <p>Key Factor Description: Percent of pine-oak systems in or dedicated to restored pine-bluestem woodland condition-MA22.</p>	<p>Indicator Name: Areal Extent Indicator Value: 14.3 Indicator Weight: 2 Current Status: Good Poor Level: <5 or >30 Fair Level: 5-10 or 31-35 Good Level: 11-15 or 26-30 Very Good Level: 15-25</p> <p>Description: Percent of pine-oak systems in or dedicated to restored pine-bluestem woodland condition-MA22</p>	
<p>Key Factor Name: Canopy closure Weighted Viability Score* 2.00</p> <p>Key Factor Description: Combination of stem density, basal area and extent of canopy cover, with intermittent closure as ideal (Surrogate for Horizontal Structure).</p>	<p>Indicator Name: Canopy Closure Indicator Value: 31 Indicator Weight: 2 Current Status: Fair Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure ranging between 40-60% (BA 40-60).</p>	
<p>Key Factor Name: Fire Regime Weighted Viability Score* 4.00</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species</p>	<p>Indicator Name: Fire Frequency Indicator Value: 83.9 Indicator Weight: 3 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 3-5 year interval.</p>	
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 77.7 Indicator Weight: 1 Current Status: Very Good Poor Level: 0-20 Fair Level: 21-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>	
<p>Key Factor Name: Percent total herbaceous ground coverage Weighted Viability Score* 2.00</p> <p>Key Factor Description: Average percent total native herbaceous ground cover across all known potential occurrences. Density must be sufficient to carry growing season fire at least once every five years. Composition should include only native species.</p>	<p>Indicator Name: Percent total herbaceous ground coverage Indicator Value: 28.4 Indicator Weight: 2 Current Status: Fair Poor Level: <25 Fair Level: 25-40 Good Level: 41-75 Very Good Level: >75</p> <p>Description: Average percent total native herbaceous ground cover across all known potential occurrences. Density must be sufficient to carry growing season fire at least once every five years. Composition should include only native species.</p>	
<p>Key Factor Name: Remoteness Weighted Viability Score* 1.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 2.06 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>	
<p>Key Factor Name: Vertical Structure Weighted Viability Score* 2.50</p> <p>Key Factor Description: The amounts and arrangement of early seral, immature and mature stands in Ouachita Pine/Blue-stem Woodland and Guild Habitat.</p>	<p>Indicator Name: Mid-Seral (Poletimber) Indicator Value: 32 (18,308 of 57,214 acres) Indicator Weight: 1 Current Status: Poor Poor Level: <10 or >40 Fair Level: 10-14 or 31-40 Good Level: 15-20 or 25-30 Very Good Level: 20-25</p> <p>Description: Mid-seral trees with herbaceous groundcover. Average percent of all known acres of Ouachita Pine/Blue-stem Woodland vegetation classification system that are in the immature (poletimber) condition.</p>	
	<p>Indicator Name: Late Seral (Immature & Mature Sawtimber) Indicator Value: 66 (37,761 of 57,214 acres) Indicator Weight: 2 Current Status: Very Good Poor Level: <30 or >95 Fair Level: 31-60 or 91-95 Good Level: 60-65 or 75-90 Very Good Level: 65-75</p> <p>Description: Mature trees with herbaceous groundcover and minimal midstory. Average percent of all known acres of Ouachita Pine/Blue-stem Woodland vegetation classification system that are in the mature (sawtimber) condition.</p>	

		<p>Indicator Name: Early Seral (Grass/Forb & Seedling/Sapling) Indicator Value: 2 (1,144 of 57,214 acres) Indicator Weight: 3 Current Status: Fair Poor Level: <2 or >12 Fair Level: 2-3 or 9-12 Good Level: 3-4 or 8-9 Very Good Level: 5-7</p> <p>Description: Young trees with herbaceous groundcover. Average percent of all known acres of Ouachita Pine/Blue-stem Woodland and Guild Habitat vegetation classification system that are in regeneration (grass/forb), seedling or non-stocked condition.</p>
Ouachita Dry-Mesic Oak Forest		Weighted Viability Score* 1.64 - Poor
<p>Key Factor Name: Canopy closure Weighted Viability Score* 4.00</p> <p>Key Factor Description: Combination of stem density, basal area and extent of canopy cover, with intermittent closure as ideal (Surrogate for Horizontal Structure).</p>	<p>Indicator Name: Canopy Closure Indicator Value: 99.2 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 80% (BA 70 or greater).</p>	
<p>Key Factor Name: Fire Regime Weighted Viability Score* 1.25</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species.</p>	<p>Indicator Name: Fire Frequency Indicator Value: 11.9 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval</p>	
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 34.8 Indicator Weight: 1 Current Status: Fair Poor Level: <25 Fair Level: 26-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is resumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>	
<p>Key Factor Name: Remoteness Weighted Viability Score* 2.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 1.07 Indicator Weight: 2 Current Status: Fair Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>	
<p>Key Factor Name: Vertical Structure Weighted Viability Score* 1.00</p> <p>Key Factor Description: The amounts and arrangement of early seral, immature and mature stands in Ouachita Dry-Mesic Oak Forest.</p>	<p>Indicator Name: Mid-Seral (Poletimber) Indicator Value: 52.1 (120,583 of 231,446 acres) Indicator Weight: 1 Current Status: Poor Poor Level: <10 or >45 Fair Level: 10-15 or 35-45 Good Level: 15-20 or 30-35 Very Good Level: 20-30</p> <p>Description: average percent of all known acres of Ouachita Dry-Mesic Oak Forest vegetation classification system that are in the immature (poletimber) condition.</p>	
	<p>Indicator Name: Late Seral (Immature & Mature Sawtimber) Indicator Value: 47.1 (109,011 of 231,446 acres) Indicator Weight: 2 Current Status: Poor Poor Level: <50 or >95 Fair Level: 50-60 or 91-95 Good Level: 60-70 or 81-90 Very Good Level: 70-80</p> <p>Description: Average percent of all known acres of Ouachita Dry-Mesic Oak Forest vegetation classification system that are in the mature (sawtimber) condition.</p>	
	<p>Indicator Name: Early Seral (Grass/Forb & Seedling/Sapling) Indicator Value: 0.79 (1,828 of 231,446 acres) Indicator Weight: 3 Current Status: Poor Poor Level: <2 or >14 Fair Level: 2-4 or 10-14 Good Level: 7-10 Very Good Level: 4-6</p> <p>Description: Average percent of all known acres of Ouachita Dry-Mesic Oak Forest vegetation classification system that are in regeneration (grass/forb), seedling or non-stocked condition.</p>	
Ouachita Mesic Hardwood Forest and Guild Habitat		Weighted Viability Score* 2.5 - Fair

<p>Key Factor Name: Canopy closure Weighted Viability Score* 4.00</p> <p>Key Factor Description: Combination of stem density, basal area and extent of canopy cover, with intermittent closure as ideal (Surrogate for Horizontal Structure).</p>	<p>Indicator Name: Canopy Closure Indicator Value: 98 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 80% (BA 70 or greater).</p>
<p>Key Factor Name: Fire Regime Weighted Viability Score* 1.50</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species</p>	<p>Indicator Name: Fire Frequency Indicator Value: 0.3 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 25-35 year interval</p>
<p>Key Factor Name: Fire Seasonality/Intensity Indicator Value: 57.3 Indicator Weight: 1 Current Status: Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn, it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>	
<p>Key Factor Name: Remoteness Weighted Viability Score* 3.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 0.80 Indicator Weight: 2 Current Status: Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>Ouachita Dry Oak Woodland Weighted Viability Score* 1.17 - Poor</p>	
<p>Key Factor Name: Fire Regime Weighted Viability Score* 1.50</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species.</p>	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 65.6 Indicator Weight: 1 Current Status: Good Poor Level: 0-20 Fair Level: 21-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
	<p>Indicator Name: Fire Frequency Indicator Value: 22.9 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval</p>
<p>Key Factor Name: Percent total herbaceous ground coverage Weighted Viability Score* 1.00</p> <p>Key Factor Description: Average percent total native herbaceous ground cover across all known potential occurrences. Density must be sufficient to carry growing season fire at least once every five years. Composition should include only native species.</p>	<p>Indicator Name: Percent total herbaceous ground coverage Indicator Value: 23.8 Indicator Weight: 2 Current Status: Poor Poor Level: <25 Fair Level: 25-40 Good Level: 41-75 Very Good Level: >75</p> <p>Description: Average percent total native herbaceous ground cover across all known potential occurrences. Density must be sufficient to carry growing season fire at least once every five years. Composition should include only native species.</p>
<p>Key Factor Name: Remoteness Weighted Viability Score* 1.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 2.02 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>Key Factor Name: Vertical Structure Weighted Viability Score* 1.00</p> <p>Key Factor Description: The amounts and arrangement of early seral, immature and mature stands in Ouachita Dry Oak Woodland.</p>	<p>Indicator Name: Late Seral (Immature & Mature Sawtimber) Indicator Value: 22.0% (1,045 of 4,670 acres) Indicator Weight: 2 Current Status: Poor Poor Level: <50 or >95 Fair Level: 50-60 or 91-95 Good Level: 60-70 or 81-90 Very Good Level: 70-80</p> <p>Description: Average percent of all known acres of Ouachita Dry Oak Woodland vegetation classification system that are in the mature (sawtimber) condition.</p>

	<p>Indicator Name: Mid-Seral (Poletimber) Indicator Value: 76.3% (3,630 of 4,670 acres) Indicator Weight: 1 Current Status: Poor Poor Level: <10 or >45 Fair Level: 10-15 or 35-45 Good Level: 15-20 or 30-35 Very Good Level: 20-30</p> <p>Description: Average percent of all known acres of Ouachita Dry Oak Woodland vegetation classification system that are in the immature (poletimber) condition.</p>
	<p>Indicator Name: Early Seral (Grass/Forb & Seedling/Sapling) Indicator Value: 1.8% (85 of 4,670 acres) Indicator Weight: 3 Current Status: Poor Poor Level: <2 or >14 Fair Level: 2-4 or 10-14 Good Level: 7-10 Very Good Level: 4-6</p> <p>Description: Average percent of all known acres of Ouachita Dry Oak Woodland vegetation classification system that are in regeneration (grass/forb), seedling or non-stocked condition.</p>
Ouachita Montane Oak Forest	
Weighted Viability Score* 2 - Fair	
<p>Key Factor Name: Fire Regime Weighted Viability Score* 1.50</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species</p>	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 67.7 Indicator Weight: 1 Current Status: Good Poor Level: <25 Fair Level: 26-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
	<p>Indicator Name: Fire Frequency Indicator Value: 1.7 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 10 year interval.</p>
<p>Key Factor Name: Remoteness Weighted Viability Score* 3.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 0.75 Indicator Weight: 2 Current Status: Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
Central Interior Acidic Cliff and Talus	
Weighted Viability Score* 2 - Fair	
<p>Key Factor Name: Fire Regime Weighted Viability Score* 1.50</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species.</p>	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 52.7 Indicator Weight: 1 Current Status: Good Poor Level: <30 or >90 Fair Level: 30-50 or 86-90 Good Level: 51-70 or 81-85 Very Good Level: 71-80</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
	<p>Indicator Name: Fire Frequency Indicator Value: 3.6 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences plus 100 meter buffer burned per 5-7 year interval.</p>
<p>Key Factor Name: Remoteness</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 0.91 Indicator Weight: 2 Current Status: Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>

Central Interior Highlands Dry Acidic Glade and Barrens		Weighted Viability Score* 1.33 - Poor	
<p>Key Factor Name: Fire Regime Weighted Viability Score* 1.50</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species</p>	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 57.3 Indicator Weight: 1 Current Status: Good Poor Level: <30 or >90 Fair Level: 30-50 or 86-90 Good Level: 51-70 or 81-85 Very Good Level: 71-80</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>		
	<p>Indicator Name: Fire Frequency Indicator Value: 23.8 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences plus 100 meter buffer burned per 5-10 year interval.</p>		
<p>Key Factor Name: Remoteness Weighted Viability Score* 1.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 2.51 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>		
Southern Arkansas Calcareous Prairie		Weighted Viability Score* 3.33 – Very Good	
<p>Key Factor Name: Fire Regime Weighted Viability Score* 3.00</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species</p>	<p>Indicator Name: Fire Frequency Indicator Value: 55 Indicator Weight: 3 Current Status: Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 3-5 year interval.</p>		
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 60 Indicator Weight: 1 Current Status: Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>		
<p>Key Factor Name: Remoteness Weighted Viability Score* 4.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 0 Indicator Weight: 2 Current Status: Very Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>		
Forested-Dense or Semi-open Pine Guild Habitat		Weighted Viability Score* 2.18 - Fair	
<p>Key Factor Name: CES202.313 OZARK-OUACHITA PINE-OAK FOREST Weighted Viability Score* 1.57</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Road Density Indicator Value: 2.33 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>		
	<p>Indicator Name: Canopy Closure Indicator Value: 93 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 70% (BA 60 or greater).</p>		

	<p>Indicator Name: Fire Frequency Indicator Value: 17.4 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p>
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 42.4 Indicator Weight: 1 Current Status: Good Poor Level: <20 Fair Level: 20-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
<p>Key Factor Name: CES203.378 WEST GULF COASTAL PLAIN PINE-HARDWOOD FOREST Weighted Viability Score* 2.00</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Canopy Closure Indicator Value: 93 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 70% (BA 60 or greater).</p>
	<p>Indicator Name: Fire Frequency Indicator Value: 6.3 Indicator Weight: 3 Current Status: Poor Poor Level: >25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 3-5 year interval.</p>
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 53.2 Indicator Weight: 1 Current Status: Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
	<p>Indicator Name: Road Density Indicator Value: 2.39 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
	<p>Indicator Name: Canopy Closure Indicator Value: 31 Indicator Weight: 2 Current Status: Fair Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure ranging between 40-60% (BA 40-60).</p>
<p>Key Factor Name: Ouachita Pine/Bluestem Woodland and Guild Habitat</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Fire Frequency Indicator Value: 2.7 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 3-5 year interval.</p>
	<p>Indicator Name: Road Density Indicator Value: 2.06 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
	<p>Indicator Name: Percent total herbaceous ground coverage Indicator Value: 100 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-40 Good Level: 41-75 Very Good Level: >75</p> <p>Description: Average percent total native herbaceous ground cover across all known potential occurrences. Density must be sufficient to carry growing season fire at least once every five years. Composition should include only native species.</p>

	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 77.7 Indicator Weight: 1 Current Status: Very Good Poor Level: 0-20 Fair Level: 21-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p> <p>Indicator Name: Percent Pine/Bluestem Indicator Value: 5.2* Indicator Weight: 2 Current Status: Fair Poor Level: <4 or >25 Fair Level: 4-6 or 21-25 Good Level: 7-9 or 16-20 Very Good Level: 10-15</p> <p>Description: Percent of all known pine-oak dominated systems known to be in pine-bluestem condition.</p>
Forested-Dry Upland Hardwood & Hardwood/Pine Guild Weighted Viability Score* 2.15 - Fair	
<p>Key Factor Name: CES202.306 OUACHITA MONTANE OAK FOREST Weighted Viability Score* 2.00</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Road Density Indicator Value: 0.75 Indicator Weight: 2 Current Status: Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p> <p>Indicator Name: Fire Frequency Indicator Value: 1.7 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 10 year interval.</p> <p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 67.7 Indicator Weight: 1 Current Status: Good Poor Level: <25 Fair Level: 26-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
<p>Key Factor Name: CES202.313 OZARK-OUACHITA PINE-OAK FOREST Weighted Viability Score* 2.00</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Canopy Closure Indicator Value: 93 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 70% (BA 60 or greater).</p> <p>Indicator Name: Fire Frequency Indicator Value: 17.4 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p> <p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 42.4 Indicator Weight: 1 Current Status: Good Poor Level: <20 Fair Level: 20-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p> <p>Indicator Name: Road Density Indicator Value: 2.33 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>Key Factor Name: CES202.708 OZARK-OUACHITA DRY-MESIC OAK FOREST Weighted Viability Score* 2.13</p>	<p>Indicator Name: Canopy Closure Indicator Value: 93 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 80% (BA 70 or greater).</p>

<p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Fire Frequency Indicator Value: 11.9 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p>
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 34.8 Indicator Weight: 1 Current Status: Fair Poor Level: <25 Fair Level: 26-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
	<p>Indicator Name: Road Density Indicator Value: 1.07 Indicator Weight: 2 Current Status: Fair Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
	<p>Oak Woodlands Guild Habitat Weighted Viability Score* 2.22 - Fair</p>
<p>Key Factor Name: CES202.314 OUACHITA NOVACULITE GLADE AND WOODLAND Weighted Viability Score* 2.50</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 82.8 Indicator Weight: 1 Current Status: Very Good Poor Level: <25 Fair Level: 26-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
	<p>Indicator Name: Road Density Indicator Value: 0 Indicator Weight: 2 Current Status: Very Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
	<p>Indicator Name: Fire Frequency Indicator Value: 0.3 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences plus 100 meter buffer burned per 3-5 year interval.</p>
<p>Key Factor Name: CES202.707 OZARK-OUACHITA DRY OAK WOODLAND Weighted Viability Score* 1.25</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 65.6 Indicator Weight: 1 Current Status: Good Poor Level: 0-20 Fair Level: 21-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
	<p>Indicator Name: Fire Frequency Indicator Value: 22.9 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p>
	<p>Indicator Name: Road Density Indicator Value: 2.02 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>

	<p>Indicator Name: Percent total herbaceous ground coverage Indicator Value: 23.7 Indicator Weight: 2 Current Status: Poor Poor Level: <25 Fair Level: 25-40 Good Level: 41-75 Very Good Level: >75</p> <p>Description: Average percent total native herbaceous ground cover across all known potential occurrences. Density must be sufficient to carry growing season fire at least once every five years. Composition should include only native species.</p>
Forested-Bottomland Hardwood Guild Habitat Weighted Viability Score*, 1.8 - Fair	
<p>Key Factor Name: CES202.703 OZARK-OUACHITA RIPARIAN Weighted Viability Score* 2.50</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Canopy Closure Indicator Value: >80 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 80% (BA 60 or greater).</p>
	<p>Indicator Name: Road Density Indicator Value: 2.57 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>Key Factor Name: CES202.705 SOUTH-CENTRAL INTERIOR LARGE FLOODPLAIN Weighted Viability Score* 4.00</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Canopy Closure Indicator Value: >80 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 80% (BA 60 or greater).</p>
	<p>Indicator Name: Road Density Indicator Value: 0 Indicator Weight: 2 Current Status: Very Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>Key Factor Name: CES203.487 WEST GULF COASTAL PLAIN SMALL STREAM AND RIVER FOREST Weighted Viability Score* 3.00</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Canopy Closure Indicator Value: >80 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 80% (BA 60 or greater).</p>
	<p>Indicator Name: Road Density Indicator Value: 1.12 Indicator Weight: 2 Current Status: Fair Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>Key Factor Name: CES203.548 WEST GULF COASTAL PLAIN WET HARDWOOD FLATWOODS Weighted Viability Score* 1.00</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 0 Indicator Weight: 1 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is resumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
	<p>Indicator Name: Fire Frequency Indicator Value: 0 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 25-35 year interval.</p>
	<p>Indicator Name: Road Density Indicator Value: 2.39 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>

Grass/Forb Guild Habitat		Weighted Viability Score* 1.56 - Poor	
<p>Key Factor Name: CES202.313 OZARK-OUACHITA PINE-OAK FOREST Weighted Viability Score* 1.33</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 42.4 Indicator Weight: 1 Current Status: Good Poor Level: <20 Fair Level: 20-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>		
	<p>Indicator Name: Road Density Indicator Value: 2.33 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>		
	<p>Indicator Name: Fire Frequency Indicator Value: 17.4 Indicator Weight: 3 Current Status: Poor Poor Level: 25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p>		
<p>Key Factor Name: CES202.707 OZARK-OUACHITA DRY OAK WOODLAND Weighted Viability Score* 1.25</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Fire Frequency Indicator Value: 22.9 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p>		
	<p>Indicator Name: Road Density Indicator Value: 2.02 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>		
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 65.6 Indicator Weight: 1 Current Status: Good Poor Level: 0-20 Fair Level: 21-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>		
	<p>Indicator Name: Percent total herbaceous ground coverage Indicator Value: 23.8 Indicator Weight: 2 Current Status: Poor Poor Level: <25 Fair Level: 25-40 Good Level: 41-75 Very Good Level: >75</p> <p>Description: Average percent total native herbaceous ground cover across all known potential occurrences. Density must be sufficient to carry growing season fire at least once every five years. Composition should include only native species.</p>		
<p>Key Factor Name: CES202.708 OZARK-OUACHITA DRY-MESIC OAK FOREST Weighted Viability Score* 1.50</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Road Density Indicator Value: 1.07 Indicator Weight: 2 Current Status: Fair Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>		
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 34.8 Indicator Weight: 1 Current Status: Fair Poor Level: <25 Fair Level: 26-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>		

	<p>Indicator Name: Fire Frequency Indicator Value: 11.9 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p>
<p>Key Factor Name: CES203.378 WEST GULF COASTAL PLAIN PINE-HARDWOOD FOREST Weighted Viability Score* 1.33</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Road Density Indicator Value: 2.39 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p> <p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 53.2 Indicator Weight: 1 Current Status: Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p> <p>Indicator Name: Fire Frequency Indicator Value: 6.3 Indicator Weight: 3 Current Status: Poor Poor Level: >25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 3-5 year interval.</p>
<p>Shrubland Guild Habitat Weighted Viability Score* 2.07 - Fair</p>	
<p>Key Factor Name: CES202.313 OZARK-OUACHITA PINE-OAK FOREST Weighted Viability Score* 1.33</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Fire Frequency Indicator Value: 17.4 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p> <p>Indicator Name: Road Density Indicator Value: 2.33 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p> <p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 42.4 Indicator Weight: 1 Current Status: Good Poor Level: <20 Fair Level: 20-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
<p>Key Factor Name: CES202.703 OZARK-OUACHITA RIPARIAN Weighted Viability Score* 1.00</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Road Density Indicator Value: 2.57 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>Key Factor Name: CES202.705 SOUTH-CENTRAL INTERIOR LARGE FLOODPLAIN Weighted Viability Score* 4.00</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Road Density Indicator Value: 0 Indicator Weight: 2 Current Status: Very Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>Key Factor Name: CES202.707 OZARK-OUACHITA DRY OAK WOODLAND Weighted Viability Score* 1.33</p>	<p>Indicator Name: Road Density Indicator Value: 2.02 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p>

<p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
	<p>Indicator Name: Fire Frequency Indicator Value: 22.9 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p>
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 65.6 Indicator Weight: 1 Current Status: Good Poor Level: 0-20 Fair Level: 21-40 Good Level: 41-70 Very Good Level: >70</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
<p>Key Factor Name: CES202.708 OZARK-OUACHITA DRY-MESIC OAK FOREST Weighted Viability Score* 1.50</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Road Density Indicator Value: 1.07 Indicator Weight: 2 Current Status: Fair Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 34.8 Indicator Weight: 1 Current Status: Fair Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
	<p>Indicator Name: Fire Frequency Indicator Value: 11.9 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 5-7 year interval.</p>
<p>Key Factor Name: CES203.378 WEST GULF COASTAL PLAIN PINE-HARDWOOD FOREST Weighted Viability Score* 1.33</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Fire Frequency Indicator Value: 6.3 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 3-5 year interval.</p>
	<p>Indicator Name: Road Density Indicator Value: 2.39 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 53.2 Indicator Weight: 1 Current Status: Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>

<p>Key Factor Name: CES203.487 WEST GULF COASTAL PLAIN SMALL STREAM AND RIVER FOREST Weighted Viability Score* 2.00</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Road Density Indicator Value: 1.12 Indicator Weight: 2 Current Status: Fair Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>Key Factor Name: CES203.548 WEST GULF COASTAL PLAIN WET HARDWOOD FLATWOODS Weighted Viability Score* 1.67</p> <p>Key Factor Description: The suitability of this ecological community to support the viability of associated species of concern.</p>	<p>Indicator Name: Road Density Indicator Value: 0.69 Indicator Weight: 2 Current Status: Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p> <p>Indicator Name: Fire Frequency Indicator Value: 0 Indicator Weight: 3 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 25-35 year interval.</p> <p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 0 Indicator Weight: 1 Current Status: Poor Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
<p>Snags Weighted Viability Score* 4 - Very Good</p>	
<p>Key Factor Name: Snag retention (Indiana Bat BO) Weighted Viability Score* 4.00</p> <p>Key Factor Description: Language from current forest standards and guides and Indiana bat BO.</p>	<p>Indicator Name: Snag retention Indicator Value: present Indicator Weight: 2 Current Status: Very Good Poor Level: absent Fair Level: absent Good Level: present Very Good Level: present</p> <p>Description: Where timber is harvested, retain or create at least two snags per acre, minimum 12-inch diameter at breast height (dbh) with an objective of 16-inch dbh or larger. Where naturally occurring snags of this size are unavailable or cannot be created, retain or create snags near the required size. Standing snags will not be felled, unless necessary for insect or disease control or to provide for safety.</p>
<p>Large Diameter Hollow Trees Weighted Viability Score* 4 - Very Good</p>	
<p>Key Factor Name: Retention of all known den trees Weighted Viability Score* 4.00</p> <p>Key Factor Description: Vegetation management treatments that allow for the retention of hollow or known den trees.</p>	<p>Indicator Name: Den retention Indicator Value: present Indicator Weight: 2 Current Status: Very Good Poor Level: absent Fair Level: absent Good Level: present Very Good Level: present</p> <p>Description: Where timber is harvested, retain or create at least two snags per acre, minimum 12-inch diameter at breast height (dbh) with an objective of 16-inch dbh or larger. Where naturally occurring snags of this size are unavailable or cannot be created, retain or create snags near the required size. Standing snags will not be felled, unless necessary for insect or disease control or to provide for safety.</p>
<p>Large Trees near Water Weighted Viability Score* 4 - Very Good</p>	
<p>Key Factor Name: Mature Forest Component Weighted Viability Score* 4.00</p> <p>Key Factor Description: Prominent, super-emergent trees (greater than 30 inch diameter at breast height) within the riparian corridors of lakes or large rivers.</p>	<p>Indicator Name: No-activity protection zone Indicator Value: present Indicator Weight: 2 Current Status: Very Good Poor Level: absent Fair Level: absent Good Level: present Very Good Level: present</p> <p>Description: MA 9-Streamside Management Area Protective Buffer</p>
<p>Ouachita Riparian Weighted Viability Score* 2.5 - Fair</p>	
<p>Key Factor Name: Canopy Closure Weighted Viability Score* 4.00</p> <p>Key Factor Description: Combination of stem density, basal area and extent of canopy cover, with intermittent closure as ideal (Surrogate for Horizontal Structure).</p>	<p>Indicator Name: Canopy Closure Indicator Value: >80 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 80% (BA 60 or greater).</p>

<p>Key Factor Name: Disturbance Policy Weighted Viability Score* 4.00</p> <p>Key Factor Description: Ouachita NF policy regarding new timber harvest, new road construction, new recreational facilities, and other new man-made disturbances within a minimum of 100 feet of known streams, rivers, lakes and ponds. Exceptions may be allowed where/when disturbances are necessary to enhance the viability of plant and animal species and their habitats.</p>	<p>Indicator Name: No-Activity Zone Indicator Value: 100 Indicator Weight: 2 Current Status: Very Good Poor Level: <100 Fair Level: <100 Good Level: 100 Very Good Level: 100</p> <p>Description: Percent of all known riparian areas covered by "No-Activity Zone" policy. "No-Activity Zone": Ouachita NF policy regarding new timber harvest, new road construction, new recreational facilities, and other man-made disturbances within a minimum of 100 feet of known streams, rivers, lakes and ponds. Exceptions may be allowed where/when disturbances are necessary to enhance the viability of plant and animal species and their habitats.</p>
<p>Key Factor Name: Remoteness Weighted Viability Score* 1.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 2.57 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: .5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>South-Central Interior Large Floodplain Weighted Viability Score* 4 - Very Good</p>	
<p>Key Factor Name: Canopy Closure Weighted Viability Score* 4.00</p> <p>Key Factor Description: Combination of stem density, basal area and extent of canopy cover, with intermittent closure as ideal (Surrogate for Horizontal Structure).</p>	<p>Indicator Name: Canopy Closure Indicator Value: >80 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 80% (BA 60 or greater).</p>
<p>Key Factor Name: Remoteness Weighted Viability Score* 4.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 0 Indicator Weight: 2 Current Status: Very Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>West Gulf Coastal Plain Small Stream/River Forest Weighted Viability Score* 3 - Good</p>	
<p>Key Factor Name: Canopy Closure Weighted Viability Score* 4.00</p> <p>Key Factor Description: Combination of stem density, basal area and extent of canopy cover, with intermittent closure as ideal (Surrogate for Horizontal Structure).</p>	<p>Indicator Name: Canopy Closure Indicator Value: >80 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of the spatial extent of all known occurrences with a percent canopy closure of greater than 80% (BA 60 or greater).</p>
<p>Key Factor Name: Remoteness Weighted Viability Score* 2.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 1.12 Indicator Weight: 2 Current Status: Fair Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
<p>West Gulf Coastal Plain Wet Hardwood Flatwoods (Red Slough) Weighted Viability Score* 3 - Good</p>	
<p>Key Factor Name: Fire Regime Weighted Viability Score* 3.00</p> <p>Key Factor Description: Fire Return Interval and Seasonality, including landscape-scale fire in surrounding/adjacent habitats to prevent woody encroachment and allow for distribution and dispersal of obligate species</p>	<p>Indicator Name: Fire Seasonality/Intensity Indicator Value: 55 Indicator Weight: 1 Current Status: Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of burned areas burned during either March/April or Aug/Sept, or from leaf-expansion to leaf-fall, depending on project-level goals. In some but not all cases, seasonality is an accurate surrogate for intensity. Since intensity goals will vary from burn to burn it is difficult to "pre-quantify" ideal intensity objectives at a forest-wide scale. It is presumed that restoration, maintenance, fuel-reduction and other prescribed fire goals will be considered at the project level when planning burn intensity.</p>
	<p>Indicator Name: Fire Frequency Indicator Value: 65 Indicator Weight: 3 Current Status: Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Average percent of all known occurrences burned per 25-35 year interval.</p>

<p>Key Factor Name: Remoteness Weighted Viability Score* 3.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 0.69 Indicator Weight: 2 Current Status: Good Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
Ouachita Mountain Forested Seep Weighted Viability Score* 2.5 - Fair	
<p>Key Factor Name: No-Activity Protection Zone Weighted Viability Score* 4.00</p> <p>Key Factor Description: 100 foot zone of no-activity by ALRMP</p>	<p>Indicator Name: Spatial extent of buffer Indicator Value: 100 Indicator Weight: 2 Current Status: Very Good Poor Level: <50 Fair Level: 50-99 Good Level: 100 Very Good Level: >100</p> <p>Description: Spatial extent of the buffer in feet from edge.</p>
<p>Key Factor Name: Remoteness Weighted Viability Score* 1.00</p> <p>Key Factor Description: Mean density of roads (miles per square mile) within this community type at the landscape scale.</p>	<p>Indicator Name: Road Density Indicator Value: 4.05 Indicator Weight: 2 Current Status: Poor Poor Level: >2 Fair Level: 1-2 Good Level: 0.5-1 Very Good Level: <0.5</p> <p>Description: Average number of road miles per square mile across all known occurrences of this target.</p>
Seeps with Minimal Woody Vegetation Weighted Viability Score* 3.5 - Very Good	
<p>Key Factor Name: Percent herbaceous groundcover Critical 0.01 - 23.07 Weighted Viability Score* 3.50</p> <p>Key Factor Description: Where burrowing crayfish occur, the percent of the site dominated by herbaceous groundcover with minimal woody vegetation that would interfere with burrowing efforts.</p>	<p>Indicator Name: Site Hydrology Indicator Value: 85% Indicator Weight: 2 Current Status: Good Poor Level: <40 Fair Level: 40-60 Good Level: 70-90 Very Good Level: >90</p> <p>Description: Percent of the area that is inundated or saturated during the fall and spring wet season.</p>
	<p>Indicator Name: Percent herbaceous groundcover with minimal woody plants Indicator Value: >90 Indicator Weight: 2 Current Status: Very Good Poor Level: <60 Fair Level: 60-70 Good Level: 70-80 Very Good Level: >90</p> <p>Description: The percent of the ground that is primarily herbaceous groundcover in areas where burrowing crayfish occur.</p>
Ouachita Ponds, Lakes and Water Holes Weighted Viability Score* 4 - Very Good	
<p>Key Factor Name: Fish-free Ponds Weighted Viability Score* 4.00</p> <p>Key Factor Description: Ponds, waterholes, and seasonal wetlands where the introduction of fish is prohibited and, in cases where accidental introductions have occurred, fish are removed.</p>	<p>Indicator Name: Fish Exclusion Policy Indicator Value: 100 Indicator Weight: 2 Current Status: Very Good Poor Level: <25 Fair Level: 25-50 Good Level: 51-75 Very Good Level: >75</p> <p>Description: Percent of all known occurrences of water bodies less than .5 acres protected by fish exclusion policy.</p>
<p>Key Factor Name: No Activity Zone Weighted Viability Score* 4.00</p> <p>Key Factor Description: Plan Language & Trauth language</p>	<p>Indicator Name: No-Activity Zone Indicator Value: Current plan only Indicator Weight: 2 Current Status: Very Good Poor Level: absent Fair Level: absent Good Level: present Very Good Level: present</p> <p>Description: 100-Foot no-activity zone.</p>
Ouachita Rivers and Streams Weighted Viability Score* 3.5 - Very Good	
<p>Key Factor Name: Hydrological Modifications Weighted Viability Score* 3.00</p> <p>Key Factor Description: Forestwide mean per HUC of the average of the ranks of Dam Density, Crossing Density & Watershed Road Density per square mile.</p>	<p>Indicator Name: Hydrological Modification Indicator Value: 3.3 Indicator Weight: 2 Current Status: Good Poor Level: 1-1.9 Fair Level: 2.0-2.9 Good Level: 3.0-3.9 Very Good Level: >4</p> <p>Description: Forestwide mean per HUC of the average of the ranks of Dam Density, Crossing Density & Watershed Road Density per square mile.</p>
<p>Key Factor Name: Land Use Weighted Viability Score* 4.00</p> <p>Key Factor Description: The effects of land use (agriculture, urbanization, forestry practices, etc.) and roads on aquatic communities expressed as: Percent increase in current and future sediment rates over geological sediment rates.</p>	<p>Indicator Name: Sediment Indicator Value: 738.53 Indicator Weight: 2 Current Status: Very Good Poor Level: >2693 Fair Level: >2693 Good Level: 1347-2693 Very Good Level: <1347</p> <p>Description: The effects of land use (agriculture, urbanization, forestry practices, etc.) and roads on aquatic communities expressed as: Percent increase in current and future sediment rates over geological sediment rates.</p>

<p>Key Factor Name: Point Source Weighted Viability Score* 3.00</p> <p>Key Factor Description: Forestwide mean per HUC of the number of Point Source Pollution permits per square mile.</p>	<p>Indicator Name: Point Source Indicator Value: 0.108 Indicator Weight: 2 Current Status: Good Poor: 0.465-0.297 Fair: 0.296-0.184 Good: 0.183-0.036 Very Good Level: <0.036</p> <p>Description: Forestwide mean per HUC of the number of Point Source Pollution permits per square mile.</p>
<p>Key Factor Name: Riparian Health Weighted Viability Score* 3.00</p> <p>Key Factor Description: Forestwide mean per HUC of the average of the ranks of Riparian Road Density & Percent Riparian Forested per square mile.</p>	<p>Indicator Name: Riparian Health Indicator Value: 3.41 Indicator Weight: 2 Current Status: Good Poor Level: 1-1.9 Fair Level: 2.0-2.9 Good Level: 3.0-3.9 Very Good Level: >4</p> <p>Description: Forestwide mean per HUC of the average of the ranks of Riparian Road Density & Percent Riparian Forested per square mile.</p>

Table E.5 Regional Forester's Invasive Exotic Plant Species List for the Ouachita National Forest

Threat Categorization and Regional Direction for Exotic, Invasive Plants in the Southern Region

Category 1 Species

These are exotic plant species that are known to be invasive and persistent throughout all or most of their range within the Southern Region. They can spread into and persist in native plant communities and displace native plant species and therefore pose a demonstrable threat to the integrity of the natural plant communities in the Region. The use of Category 1 Species is prohibited on National Forest System Lands. Cooperators and Partners may not establish or encourage Category 1 Species for any reason in projects that receive Forest Service funding except in the furtherance of projects, Memorandum of Understandings (MOUs), and Memorandum of Agreements (MOAs) that were in effect on the date of issuance of the Regional Exotic Invasive Plant Species List, or as required for scientific studies designed to further knowledge about invasive species. Efforts to control Category 1 Species are encouraged where practicable. Proposals for exotic, invasive plant species control will receive the highest funding priority when they include Category 1 Species, particularly where native plant communities are threatened. Select among the Category 1 species for the purposes of compliance with Contract Provisions that address "noxious" weeds (e.g., CT6.36, cf. 2430 Forest Products Director's letter of 18 December 2000).

Category 2 Species

These are exotic plant species that are suspected to be invasive or are known to be invasive in limited areas of the Southern Region. Category 2 Species will typically persist in the environment for long periods once established and may become invasive under favorable conditions. Plant species in Category 2 pose a significant risk to the integrity of natural plant communities throughout the Region or in parts of the Region. The establishment or encouragement of Category 2 Species is prohibited in areas where ecological conditions would favor invasiveness and is discouraged elsewhere. Projects that use Category 2 Species should document why no other (noninvasive exotic or native) species will serve the purpose and need. Cooperators and Partners are also discouraged from using Category 2 Species. The Forest botanist, plant ecologist, or Forest noxious weed coordinator (or Regional specialists) should be consulted for alternative native or non-invasive exotic species that would serve the purpose and need of the project. Control efforts for Category 2 Species may or may not be necessary to achieve the management objectives of the planning area.

Table E.5 Regional Forester's Invasive Exotic Plant Species List for the Ouachita National Forest

Scientific Name	Common Name(s)	Habitat	Comments	Category
<i>Ailanthus altissima</i>	Tree of heaven	Canopy openings, roadsides, and open woods	Increasing Benefits from ground disturbance. Colonizes by root sprouts. Seeds are dispersed by wind and water.	1
<i>Albizia julibrissin</i>	Mimosa, Silk tree	Roadsides, stream banks, canopy openings, old fields	Common Benefits from ground disturbance. Colonizes by root sprouts. Seeds are dispersed by animals and water.	1
<i>Allium vineale</i>	Wild garlic	Open fields, roadsides and glades	Common Benefits from ground disturbance.	2
<i>Alliaria petiolata</i>	Garlic mustard	Mesic woods, and floodplains	Not known to occur on the Ouachita NF at this time. Tolerates shade. Dispersed by hikers, vehicles, ATVs, & wildlife	1
<i>Arthraxon hispidus</i>	Carpgrass	Wet areas in pastures and prairies, roadside ditches, and along streams	Infrequent Benefits from ground disturbance. Does well on moist soils. Spread by mowing and ground disturbance.	2
<i>Bromus spp.</i>	Cheatgrass, brome grass, chess	Roadsides, glades, rocky open woodlands	Common Spread by mowing and ground disturbance. Native species in Arkansas are <i>B. pubescens</i> & <i>B. nottowanus</i> . All others are potential invasives	2
<i>Carduus nutans</i>	Nodding thistle, musk thistle	Roadsides, glades, pastures, old fields	Common Spreading rapidly Likely spread by mowing and ground disturbance.	2
<i>Celastrus orbiculatus</i>	Oriental bittersweet	Forest edges, disturbed woods	Infrequent Likely to spread, probably dispersed by birds.	1
<i>Centaurea beibersteinii</i> (incl. <i>C. maculosa</i> and <i>C. stoebe</i>)	Spotted knapweed, Russian knapweed	Roadsides, glades, prairies, pastures, old fields	Common and spreading in Arkansas. Allelopathic properties.	2
<i>Cirsium vulgare</i>	Bull thistle	Roadsides, glades, prairies, pastures, old fields	Common Benefits from ground disturbance.	2
<i>Coronilla varia</i>	Crown vetch	Roadsides,	Common Competes with native species.	2
<i>Dioscorea batatas</i> (= <i>D. oppositifolia</i>)	Chinese yam	Riparian areas, roadsides and mesic sites	Spreading Competes with native species.	1
<i>Dioscorea bulbifera</i>	Air potato,	Riparian areas, roadsides and mesic sites	Spreading Competes with native species.	1
<i>Eichhornia crassipes</i>	Common water hyacinth	Aquatic	Infrequent Competes with native species.	1
<i>Elaeagnus spp.</i> (<i>E. umbellata</i> , <i>E. pungens</i> , <i>E. angustifolia</i>)	Russian olive, thorny olive, autumn olive	Forest edge, along streams	<i>E. umbellata</i> and <i>E. pungens</i> are naturalized widely in Arkansas. Both were planted for wildlife in the past	1

Scientific Name	Common Name(s)	Habitat	Comments	Category
<i>Eragrostis curvula</i>	Weeping lovegrass	Roadsides, glades, rocky open areas	Planted along roadsides. Does well in thin soils. Invades glade for this reason. Spread by mowing.	2
<i>Euonymus fortunei</i>	Wintercreeper Euonymus	Mesic woods	Infrequent Covers ground (evergreen). Flowers & Fruits when it climbs trees. Seeds dispersed by birds.	1
<i>Hedera helix</i>	English ivy	Woods	Spreads from old plantings, home sites, etc.	2
<i>Hydrilla verticillata</i>	Waterthyme	Aquatic	Competes with native species.	1
<i>Lespedeza cuneata</i>	Sericea lespedeza	Roadsides, glades, prairies, pastures	Abundant Invades open habitat. Very difficult to eradicate	1
<i>Ligustrum sinense</i> (& <i>L. vulgare</i>)	Privet	Mesic woods, prairies, margins of glades, stream corridors	Major problem in Arkansas. Spread by birds. Can be controlled by cutting and treating stumps with herbicide	1
<i>Lolium arundinaceum</i> (a.k.a <i>Festuca arundinacea</i>)	Tall fescue	Roadsides, prairies, pastures, old fields	Invades prairies and is difficult to eradicate. Spread by mowing and water flow.	1
<i>Lonicera japonica</i>	Japanese honeysuckle	All habitats	Major problem in Arkansas. Competes with native vegetation in a variety of habitats. Repeated fire will control.	1
<i>Lonicera maackii</i>	Bush honeysuckleshrub honeysuckle	Forest edge, mesic woods, dry woods, glades	Spreading Forms dense thickets.	1
<i>Lythrum salicaria</i>	Purple loosestrife	Wetlands	Known from Ozarks. Needs to be watched for.	1
<i>Kummerowia striata</i> (= <i>Lespedeza striata</i>)	Japanese clover	Forest edge, roadsides	Common Benefits from soil disturbance	2
<i>Melia azedarach</i>	Chinaberry	Forest edge, pastures, old fields	Scattered Seeds dispersed by birds.	2
<i>Microstegium vimineum</i>	Japanese stiltgrass, Nepalese browntop	Mesic woods, stream corridors	Spreading rapidly. Spread by water flow and mowing. Capable of displacing all native herbaceous vegetation on stream terraces.	1
<i>Pueraria montana</i>	Kudzu	Forest edges, roadsides, pastures, and adjacent areas	Common Seeds dispersed by wind, animals and water	1
<i>Rosa multiflora</i>	Multiflora rose	Forest edges, roadsides, clearings, pastures, old fields, prairies, canopy openings, stream corridors	Common Spreads from old plantings, home sites, etc. Seeds dispersal by birds.	1
<i>Sorghum halepense</i>	Johnson grass	Forest edge, roadsides, pastures, old fields, prairies, margins of glades	Common Benefits from soil disturbance	1
<i>Verbena brasiliensis</i>	Brazilian vervain	Forest edge, roadsides, pastures, old fields, prairies, glades	Common Benefits from soil disturbance	1

Scientific Name	Common Name(s)	Habitat	Comments	Category
<i>Wisteria sinense</i> (& possibly <i>W. floribunda</i>)	Chinese wisteria	Forest edge, old fields, pastures, etc.	Spreads from old plantings, home sites, etc. Can kill trees, damage buildings, etc.	2

Appendix F – Minerals

The Ouachita National Forest is located in Central Arkansas, within the Ouachita Mountains and the very southern portion of the Arkansas River Valley, and in southeastern Oklahoma in the Ouachita Mountains and the Red River Valley (Idabel, Oklahoma area). The geologic setting of the Forest provides a diversity of energy and non-energy mineral resources. Since approval of the 1986 Land Management Plan, minerals from the Forest, including natural gas, hardrock, and mineral materials, have been used to meet the basic needs of the public, such as providing natural gas fuel for energy sources and heating homes; stone for construction and functional home projects, and road surfacing/maintenance materials. Development of the federal and private minerals underlying the National Forest stimulates the local and national economies by making available the raw materials needed for continued economic development, resulting in increased jobs and spending.

The sustainability of the Forest depends on the continued use of mineral resources to meet the public's demand for such things as fuels and building materials. The role of mineral resources is fundamental to viability of human ecosystems. The goals for management of the Ouachita National Forest were developed in consideration of the other national forests within the Southern Region. Any decisions on projects to implement the Revised Forest Plan will be based on site-specific analysis in compliance with the National Environmental Policy Act (NEPA). These environmental analyses will be appropriately documented according to direction in the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR Parts 1500-1508) and the Environmental Policy and Procedures Handbook (FSH 1909.15).

Topics within this Appendix include:

- The geologic table and the descriptions for each of the geologic formations on the Ouachita National Forest
- Oil and Gas Reasonable Foreseeable Development Scenario provided by the USDI Bureau of Land Management (BLM) for the Ouachita National Forest
- Minerals Laws and Authorities
- Withdrawal Review
- Minerals Program procedures for managing Federal minerals on the Ouachita National Forest
- Oil and Gas Leasing Stipulations

Geology

General Ouachita Geology: The Ouachita National Forest is located in the heart of the Ouachita Mountains through the west central portion of Arkansas and the southeastern portion of Oklahoma. The Forest is principally within the physiographic province referred to as the "Ouachita Province." In Arkansas, the northern portions of the Poteau, Cold Springs, and Fourche Ranger Districts are within the "Arkansas Valley Province." The Ouachita Province is a mountainous, geologically complex area located between the Gulf Coastal Plain to the south and the Arkansas Valley to the north. These other physiographic provinces are also known for their oil and gas production and potential. The physiographic "Ouachita Province" is subdivided into the Fourche Mountains in the northern half of the Forest, and the Novaculite uplift in the southern half of the Forest. The Ti Valley/Winding Stair/Choctaw fault system is projected through the northern portion of the Forest in eastern Oklahoma and western Arkansas. Major structural and stratigraphic changes caused by this significant fault system occur between the Arkoma Basin to the north of the Forest and the Ouachita Mountains. Geologically, the area between the Choctaw and Winding Stair faults is referred to as the "frontal" part of the Ouachita

Mountains and represents the geologic transition zone between the Ouachitas and the Arkoma Basin. The rock sequence south of the Ti Valley fault is referred to as the "Ouachita Mountain facies" and may reflect a north-northwest thrust of approximately 20 miles. The "Broken Bow - Benton uplift" extending through the southern third of the Forest from Benton, Arkansas south-southwest to Broken Bow, Oklahoma, is the principal anticlinal fold of the Ouachita Mountains.

Table F.1 Geologic Column for the Ouachita National Forest

Era	Period	Formation	Occurs on Ranger District Number¹
Cenozoic	<i>Quaternary</i>	Qal Alluvium	All RD's
		Qt Terrace Deposits	1,5,12
Mesozoic	<i>Cretaceous:</i>	upper Kob Ozan (Ko) and Brownstone (Kbr)	12
		upper Kt, Kto Tokio	12
		upper Kw Woodbine	12
		lower Kk Kiamichi	12
		lower Kg, Kgw Goodland	12
Paleozoic	<i>Pennsylvanian:</i>	Des Moines Ps, Psv Savanna	3,9
		Des Moines Pm, Pma, Pms McAlester	1,3,6,9
		Des Moines Phs Hartshorne	1,3,9
		Atoka Pa: Pau, Pam, Pal Atoka Formation	1,3,4,5,6,7,8,9,11
		Morrow Pjv Johns Valley Shale	1,4,5,6,7,8,9,11
		Morrow Pj Jackfork Sandstone	1,2,4,5,6,7,8,9,11,12
	<i>Mississippian</i>	Ms, PMs, Mst Stanley Shale	2,5,6,7,8,10,11,12
	<i>Devonian</i>	MDa Arkansas Novaculite (MDSa)	2,5,7,10,11,12
	<i>Silurian</i>	Smb Missouri Mtn. Shale (Sm) & Blaylock Sandstone (Sb)	2,5,7,8,10,12
	<i>Ordovician</i>	upper Obf Bigfork Chert	5,12
		upper Obp, Obfp Bigfork Chert (Obf) & Polk Creek Shale (Op)	2,5,7,8,10,11,12
		middle Ow Womble Shale	2,5,10,11,12
		middle Ob, Oby Blakely Sandstone	2,5,10
		lower Om Mazarn Shale	5,10
		lower Ocm Crystal Mountain Sandstone	2,10
	<i>Cambrian/Ordovician</i>	COc Collier Shale	2,10,12

¹Ranger Districts: (1) Choctaw, (2) Caddo, (3) Cold Springs, (4) Fourche, (5) Jessieville, (6) Kiamichi, (7) Mena, (8) Oden, (9) Poteau, (10) Womble, (11) Winona, (12) Tiak

Geology of the Arkansas and the Oklahoma Portions of the Ouachita National Forest

I. Stratigraphic Summary of the Arkansas Valley and Ouachita Mountains

Reprinted with permission from John David McFarland, Arkansas Geological Commission (AGC), Little Rock, Arkansas, from the AGC website at <http://www.state.ar.us/agc/stratigr.htm>.

The Arkansas Valley is dominated by Pennsylvanian clastic sediments deposited on the margin of a continental shelf primarily by deltas and reorganized in part by marginal marine processes. Structurally, the area is made up of broad synclines with relatively narrow intervening anticlines. The axes of these folds generally trend east-west. Most of the observed faulting is normal, but some thrusts faults are noted, associated with the anticlines in the southern part of the province. The synclines are often the most conspicuously present positive topographic features, formed from more rapid erosion of underlying shales, once capping sandstones were breached on the crests and flanks of the surrounding anticlines.

The Ouachita Mountains are made up of complexly folded and faulted Paleozoic age sedimentary rocks that were originally deposited in mostly deep marine environments. The continental collision during the late Paleozoic that pushed up this region produced a structural fabric that trends more or less east-west. The folding was intricate at all scale levels and several local sequences, both complete and partial, are overturned. Compressional faulting is commonly expressed in the sequence throughout the area. The Ouachita province, in a general sense, can be considered an anticlinorium with Late Cambrian and Ordovician deposits being exposed in the center and Mississippian and Pennsylvanian sedimentary units exposed around the margins. The area is cut off to the east by the Gulf Coastal Plain and Mississippi Embayment.

COLLIER SHALE/FORMATION [COc]

Age: Late Cambrian Period and Early Ordovician Period

Distribution: West-central Arkansas, Ouachita Mountains (principally Montgomery and Garland Counties); southeastern Oklahoma

Geology: The sequence is composed of gray to black, lustrous shale containing occasional thin beds of dense, black, and intensely fractured chert. An interval of bluish-gray, dense to spary, thin-bedded limestone may be present. Near its top, the limestone is conglomeratic and pelletaloid, in part, with pebbles and cobbles of limestone, chert, meta-arkose, and quartz. The entire unit displays intensive deformation and frequent small quartz veins. Fossils are rare, but include trilobites and conodonts. The base of the formation is not exposed, but the total thickness exposed exceeds 1000 feet.

Original reference: A. H. Purdue, 1909, Geological Society of America Bulletin v. 19, p. 557; A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 31.

Type locality: Named for Collier Creek, Montgomery County, Arkansas.

CRYSTAL MOUNTAIN SANDSTONE/FORMATION [Ocm]

Age: Early Ordovician Period

Distribution: West-central Arkansas, Ouachita Mountains (principally Montgomery and Garland Counties); southeastern Oklahoma

Geology: The formation is typically composed of massive, coarse-grained, well-rounded, light-gray sandstone. Lesser amounts of interbedded light-gray to gray shale, black chert, bluish-gray limestone, and gray calcareous conglomeratic sandstone (often containing clasts of meta-arkose) are usually present. Some large boulders of meta-arkose and other exotics occur in some slurried conglomerate intervals. The unit is often set with a network of quartz veins up to several inches thick. In some places the quartz veins are open (up to several feet wide) allowing clusters of quartz crystals to form. Conodonts are present in this formation. The contact with the

underlying Collier Shale is considered conformable. Typical thicknesses of the unit range from 500 to 850 feet, but some sites may have less than 50 feet.

Original reference: A. H. Purdue, 1909, Geological Society of America Bulletin v. 19, p. 557; A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 32.

Type locality: Named for the Crystal Mountains, Montgomery County, Arkansas.

MAZARN SHALE/FORMATION [Om]

Age: Early Ordovician Period

Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma

Geology: The formation is predominantly shale with small amounts of siltstone, silty to conglomeratic sandstone, limestone, and glossy black chert. The shale is mostly gray-black, but thin layers of olive-gray silty shale or siltstone are interbedded with the darker shales in some sequences. When the dark and greenish shales are cleaved at an angle to bedding, they yield a ribboned surface. In many places quartzose siltstone or very fine-grained sandstone is present. Dense, bluish-gray, thin-bedded limestones may be present throughout the interval. Thin to thick beds of gray sandstone are occasionally found at random horizons, notably in the upper and lower portions of the sequence. The cherts are usually found in the upper part of the unit. Milky quartz veins are common in some areas. Only conodonts and a few graptolites have been noted. The unit is conformable with the underlying Crystal Mountain Sandstone. The thickness of the Mazarn Shale ranges from 1,000 feet to over 2,500 feet.

Original reference: H. D. Miser, 1917, U. S. Geological Survey Bulletin, V. 660, p. 68.

Type locality: Named for Mazarn Creek (headwaters), eastern Montgomery County, northeastern Caddo Gap Quadrangle, Arkansas.

BLAKELY SANDSTONE/FORMATION [Ob]

Age: Middle Ordovician Period

Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma

Geology: The formation consists of black and green shale in alternating layers with hard, gray sandstone and some bluish-gray limestone. Although the shale may locally make up 50 to 75 percent of the sequence, the sandstones appear dominant due to their erosion resistance. The sandstones are light-gray to blue, medium-grained, well-cemented, and in thin to thick beds. Silica or calcite may be present as cement. Where the cement is silica the sandstone is quartzite and is quite resistant to weathering. Erratic meta-arkose boulders and pebbles occur in some conglomeratic sandstones. The shales of the Blakely are sometimes ribboned much like the Mazarn shales. Graptolites and conodonts are the fossils reported from the formation. The lower contact is considered conformable. The thickness ranges from a few feet to about 700 feet.

Original reference: E. O. Ulrich, 1911, Geological Society of America Bulletin, V. 22, p. 676.

Type locality: Named for Blakely Mountain, Garland County, Arkansas.

WOMBLE SHALE/FORMATION [Ow]

Age: Middle Ordovician Period

Distribution: West-central Arkansas, Ouachita Mountains; southern Oklahoma

Geology: The Womble Formation is mostly black shale with thin layers of limestone, silty sandstone, and some chert. Some green shales are interbedded with the black shales, but less so than in the Mazarn Shale. Cleavage, at an angle to bedding, frequently displays ribboned cleavage surfaces. The sandstones are dark-gray, compact, fine-grained, occasionally conglomeratic, and may be phosphatic. These sandstones are generally present in the lower part of the formation. Dense, blue-gray limestones usually occur near the top of the formation in thin to medium beds. Black chert also is present as thin layers at the top of the formation. Large milky quartz veins often fill fractures in the formation. Graptolite and conodont fossils have been noted from the Womble Shale. The formation rests conformably on the underlying Blakely Sandstone and ranges from 500 to 1,200 feet in thickness.

Original reference: H. D. Miser, 1917, U. S. Geological Survey Bulletin 600, p. 67

Type locality: Named for the town of Womble (now called Norman) in Montgomery County, Arkansas.

BIGFORK CHERT/FORMATION [Obf]

Age: Middle and Late Ordovician Period

Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma

Geology: The Bigfork Chert consists of thin-bedded, dark-gray, cryptocrystalline chert interbedded with varying amounts of black siliceous shale, calcareous siltstone, and dense, bluish-gray limestone. The cherts normally occur in thin to medium beds and are usually highly fractured. The interbedded siliceous shales occur in thin to thick sequences and are often pyritic. Limestones occur mostly as interbeds in the chert and typically weather to soft brown layers. The limestones are more common in the northwestern exposures. Fossils are rare, but fragments of brachiopods, crinoids, sponges, conodonts, and graptolites have been reported. The contact between the Bigfork Chert and the underlying Womble Shale is conformable. The Bigfork in Arkansas ranges in thickness from about 450 feet in the northern Ouachitas to about 750 feet in the southern Ouachitas.

Original reference: A. H. Purdue, 1909, Geological Society of America Bulletin v. 19, p. 557; A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 35.

Type locality: Named for exposures near the Bigfork Post Office, Montgomery County, Arkansas.

POLK CREEK SHALE/FORMATION [Opc]

Age: Late Ordovician Period

Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma

Geology: The Polk Creek rocks are black, sooty, fissile shale with minor black chert and traces of gray quartzite and limestone. Graptolites are common in most of the shales in the formation. The Polk Creek Shale rests conformably on the Bigfork Chert. Its thickness ranges from about 50 to 225 feet.

Original reference: A. H. Purdue, 1909, Geological Society of America Bulletin v. 19, p. 557; A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 36.

Type locality: Named for Polk Creek, Caddo Gap Quadrangle, Montgomery County, Arkansas.

BLAYLOCK SANDSTONE/FORMATION [Sb]

Age: Silurian Period

Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma

Geology: The Blaylock Sandstone consists of fine- to medium-grained sandstone of tan, dark-gray, or greenish color, interbedded with dark-colored to black, fissile shale in the southern Ouachita Mountains. The sandstones are usually thin-bedded, but some intervals consist of fairly thick beds. The sandstones tend toward wackestones with small amounts of plagioclase, zircon, tourmaline, garnet, leucoxene, and mica. The shales, which may dominate thick sequences, are usually dark-gray and micaceous. Fossils are rare: only graptolites and a few trace fossils have been reported. The unit rests conformably on the Polk Creek Shale. The formation ranges from as much as 1,200 feet thick along the southwestern part of its outcrop area in Arkansas, but thins dramatically to the north where it is frequently represented by only 5 to 20 feet of olive-gray shale.

Original reference: A. H. Purdue, 1909, Geological Society of America Bulletin v. 19, p. 557; A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 37.

Type locality: Named for Blaylock Mountain, Montgomery County, Arkansas.

MISSOURI MOUNTAIN SHALE/FORMATION [Sm]

Age: Silurian Period

Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma

Geology: The Missouri Mountain Formation is a shale interbedded with various amounts of conglomerate, novaculite, and sandstone. The shales are usually gray, green, black, or red and weather to buff, green, yellow, or reddish-brown. Conglomerate is normally present at or near the base of the unit and may be up to 4 feet thick. Thin beds of novaculite are present in the upper part of the unit. Thin quartzitic sandstones occur throughout the unit, but are more common in the upper and lower parts. Few identifiable fossils have been found in the Missouri Mountain Shale. The formation rests conformably on the Blaylock Sandstone to the south and on the Polk Creek Shale in the northern part of its outcrop range. It reaches a maximum of about 300 feet in thickness.

Original reference: A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 37.

Type locality: Named for exposures in the Missouri Mountain, Polk and Montgomery Counties, Arkansas.

ARKANSAS NOVACULITE FORMATION [MDa]

Age: Devonian and Early Mississippian Periods

Distribution: West-central Arkansas, Ouachita Mountains; southeastern Oklahoma; equivalent novaculite-bearing formation in Texas is the Caballos Novaculite

Geology: Three Divisions of the Arkansas Novaculite Formation are recognized (except in the northern exposures). The Lower Division is a white, massive-bedded novaculite with some interbedded gray shales near its base. The Middle Division consists of greenish to dark gray shales interbedded with many thin beds of dark novaculite. The Upper Division is a white, thick-bedded, often calcareous novaculite. Conodonts and other microfossils are sometimes common in the Arkansas Novaculite. The formation rests conformably on the Missouri Mountain Formation at most places, but the presence of conglomerates in a few places suggests a possible minor incipient submarine disconformity. The formation may attain a thickness of up to 900 feet in its southern outcrops, but thins rapidly to about 60 feet to the north.

Original reference: A. H. Purdue, 1909, Slates of Arkansas: Arkansas Geological Survey, p. 30, 39-40; (L. S. Griswold, 1892, Arkansas Geological Survey Annual Report 1890, V. 3, p. 57-61, 69, 85, 87-113).

Type locality: Named for quarries in Arkansas (especially near Hot Springs in Garland County) that produced this rock under the trade name of "Arkansas Novaculite."

STANLEY SHALE/FORMATION (GROUP) [Mst/Ms/PMs]

Age: Mississippian Period

Distribution: West-central Arkansas, Ouachita Mountains; central southern and southeastern Oklahoma

Geology: The Stanley Shale is composed of dark-gray shale interbedded with fine-grained sandstone. A thick sandstone member, the Hot Springs Sandstone, is found near the base of the sequence and an equivalent thin conglomerate/breccia occurs at the base of the unit in many other places. Stratigraphically minor amounts of tuff, chert, bedded and vein barite, and conglomerate have also been noted in various parts of the sequence. Silty sandstones outside the Hot Springs Sandstone Member are normally found in thin to massive beds separated by thick intervals of shale. The tuffs (Hatton Tuff Lentil and others) seem to be restricted to the lower part of the Stanley Shale. Cherts are sometimes present in the middle and upper parts of the formation. Both plant and invertebrate fossils occur in the Stanley Shale, but the preservation is usually poor. The Hot Springs Sandstone and conglomerate/breccia at the base of the formation possibly indicates a submarine disconformity between the Stanley Shale and the Arkansas Novaculite in Arkansas. The total thickness of the Stanley Formation varies from 3,500 feet to over 10,000 feet. The Hot Springs Sandstone may be as much as 200 feet thick in the area around Hot Springs, but is thinner elsewhere.

Original reference: J. A. Taff, 1902, U. S. Geological Survey Geological Atlas, Folio 79

Type locality: Named for Stanley, Pushmataha County, Oklahoma.

JACKFORK SANDSTONE/FORMATION (GROUP) [Pj]

Age: Pennsylvanian Period, Morrowan Series

Distribution: West-central Arkansas, Ouachita Mountains; southeastern and central southern Oklahoma

Geology: The Jackfork Sandstone is thin- to massive-bedded, fine- to coarse-grained, brown, tan, or bluish-gray quartzitic sandstones with subordinate brown, silty sandstones and gray-black shales. Toward the north of its outcrop area the shale units of the lower and middle Jackfork Sandstone take up more of the section and the sandstones are more lenticular, often occurring as chaotic masses in the shale. Minor conglomerates composed of quartz, chert, and metaquartzite occur notably in the southern exposures of the formation. A few poorly preserved invertebrate and plant fossils have been recovered from the Jackfork Formation. The Jackfork Sandstone rests conformably on the Stanley Shale and varies between 3,500 to 6,000 feet in thickness.

Original reference: J. A. Taff, 1902, U. S. Geological Survey Geological Atlas, Folio 79.

Type locality: Named for Jackfork Mountain, Pittsburg and Pushmataha Counties, Oklahoma.

JOHNS VALLEY SHALE/FORMATION [Pjv]

Age: Pennsylvanian Period, Morrowan Series

Distribution: West-central Arkansas, Ouachita Mountains, southern Arkansas River Valley; southeastern Oklahoma

Geology: The Johns Valley Shale is generally a gray-black clay shale with numerous intervals of silty, thin to massive, brownish-gray sandstone. Small amounts of gray-black siliceous shale and chert have also been noted. In the frontal Ouachita Mountains the unit contains large quantities of erratic rocks (limestones, dolostones, cherts, etc.) formed by submarine slumping of older stratigraphic units to the north. The Johns Valley Shale is conformable with the underlying Jackfork Sandstone. Due to the high degree of structural deformation, the total thickness of the unit is difficult to estimate, but it likely exceeds 1,500 feet in thickness.

Original reference: E. O. Ulrich, 1927, Oklahoma Geological Survey Bulletin 45, p. 6, 21-23, 30, 36-37.

Type locality: Named for Johns Valley, Pushmataha County, Oklahoma; exposures in the center of the Tuskahoma syncline (N 1/2, T1S, R16E).

ATOKA FORMATION [Pa: Pal Pam Pau]

Age: Pennsylvanian Period, Atokan Series

Distribution: In Arkansas the Boston Mountains, Arkansas River Valley, and Ouachita Mountains; eastern Oklahoma, eastern New Mexico, and central and western Texas

Geology: The Atoka Formation is a sequence of marine, mostly tan to gray silty sandstones and grayish-black shales. Some rare calcareous beds and siliceous shales are known. This unit has the largest areal extent of any of the Paleozoic formations in the state. It is the surface rock of the Boston Mountains and dominates the exposures in the Arkansas River Valley and the frontal Ouachita Mountains. It is also present in the southern part of the Ouachita Mountains. In the Arkansas River Valley and the frontal Ouachita Mountains, the Atoka Formation has been subdivided into upper, middle, and lower lithic members based on regionally mappable shale or sandstone intervals. The unit locally contains discontinuous streaks of coal and coaly shale in the Boston Mountains and Arkansas River Valley. Fossil plants, generally poorly preserved, are common throughout the section. Poorly preserved invertebrate fossils are much less common than plant fossils, but have been reported from several horizons. Trace fossils are relatively common in the Atoka Formation. The formation is conformable with the Bloyd Shale in the Boston Mountains and with the Johns Valley Shale in the Ouachita Mountains. The unit may be up to 25,000 feet in thickness in the Ouachita Mountains, although only large incomplete sections are known.

Original reference: J. A. Taff and G. I. Adams, 1900, U. S. Geol. Survey 21st Ann. Rept., pt. 2, p. 273.

Type locality: Named for Atoka, Atoka County, Oklahoma.

HARTSHORNE SANDSTONE/FORMATION [Phs]

Age: Pennsylvanian Period, Desmoinesian Series

Distribution: West-central Arkansas, Arkansas River Valley; eastern Oklahoma

Geology: The Hartshorne Sandstone is a brown to light-gray, massive, frequently cross-bedded, medium-grained sandstone. It is the first continuous sandstone underlying the Lower Hartshorne Coal. The formation is a prominent ledge-former under favorable structural conditions. A few fragmental plant fossils have been noted in the formation. The Hartshorne Sandstone rests with minor unconformity on the Atoka Formation. The unit's thickness ranges from about 10 to 300 feet.

Original reference: J. A. Taff, 1899, U. S. Geol. Survey 19th Ann. Rept., pt. 3, p. 436

Type locality: Named for exposures near Hartshorne, Pittsburg County, Oklahoma.

MCALESTER FORMATION [Pma]

Age: Pennsylvanian Period, Desmoinesian Series

Distribution: Western Arkansas River Valley, Arkansas coal fields; eastern Oklahoma

Geology: The McAlester Formation consists of (in ascending order): several hundred feet of shale with thin sandstone and coal (the Lower Hartshorne Coal is just above the base), several hundred feet of shale with a few sandstone beds and coal (Upper Hartshorne Coal), and capped by several hundred feet of shale with a few coal beds. Plant and a few invertebrate fossils have been reported from several horizons within the formation. The McAlester Formation rests conformably on the Hartshorne Sandstone. The unit ranges from about 500 to 2,300 feet in thickness.

Original reference: J. A. Taff, 1899, U. S. Geol. Survey 19th Ann. Rept., pt. 3, p. 437

Type locality: Named for exposures around McAlester, Pittsburg County, Oklahoma.

SAVANNA FORMATION [Psv]

Age: Pennsylvanian Period, Desmoinesian Series

Distribution: Western Arkansas River Valley; eastern and southern Oklahoma

Geology: The Savanna Formation consists mostly of dark-gray shale and silty shale. It contains minor amounts of light-gray siltstone and medium-gray, very fine- to fine-grained sandstone. On rare occasions, the sandstones may contain rounded, coarse-grained, quartz sand. The beds at the base and top of the section are normally the thickest. At least six coal beds are present in the formation. The unit caps isolated synclinal mountains in the western Arkansas River Valley. Fossils are few, but plant and marine invertebrate faunas have been recovered. The Savanna Formation is conformable with the underlying strata. The Savanna Formation is about 1,600 feet in thickness at its type section, but the top several hundred feet of the sequence is usually missing in Arkansas.

Original reference: J. A. Taff, 1899, U. S. Geol. Survey 19th Ann. Rept., pt. 3, p. 437

Type locality: Named for Savanna, Pittsburg County, Oklahoma.

BOGGY FORMATION

Age: Pennsylvanian Period, Desmoinesian Series

Distribution: Generally limited to isolated exposures in the Arkansas River Valley; fairly widespread in central southern and eastern Oklahoma

Geology: Only basal portions of the Boggy Formation are present in Arkansas. It is composed of light-gray, fine- to medium-grained, silty, micaceous sandstone. Typically the sandstones are cross-bedded, ripple-marked, and contain thin beds of light-gray siltstone and dark-gray shale. Plant fossils have been recovered, associated with some thin coal beds in the Boggy Formation of Oklahoma. The basal sandstone sequence fills channels cut into the underlying Savanna

Formation. About 225 feet of the lower Boggy Formation are present in Arkansas, but the unit may reach 1,100 feet in thickness in Oklahoma.

Original reference: J. A. Taff, 1899, U. S. Geol. Survey 19th Ann. Rept., pt. 3, p. 438.

Type locality: Named for exposures along North Boggy Creek, Pittsburg and Atoka County, Oklahoma.

TERRACE DEPOSITS [Qt]

Age: Quaternary Period, Pleistocene Epoch

Distribution: Arkansas River valley and significant tributaries

Geology: The terrace deposits include a complex sequence of unconsolidated gravels, sandy gravels, sands, silty sands, silts, clayey silts, and clays. The individual deposits are often lenticular and discontinuous. At least three terrace levels are recognized with the lowest being the youngest. Fossils are rare. The lower contact is unconformable and the thickness is variable.

ALLUVIUM [Qal]

Age: Quaternary Period, Holocene Epoch

Distribution: Flood plains of the Arkansas River and significant tributaries

Geology: The deposits indicated by this notation are alluvial deposits of present streams. Sediments will include gravels, sands, silts, clays, and mixtures of any and all of these clastic materials. The partition of this unit from other Holocene alluvial deposits was on the basis of geomorphic considerations rather than age or lithology. Fossils are rare and modern. The lower contact is unconformable and the thickness is variable.

II. Geologic descriptions of the Oklahoma portion of the Ouachita National Forest

Geologic descriptions Oklahoma portion of the Ouachita National Forest are similar to the Arkansas descriptions for the Arkansas side. Additional descriptive information taken primarily from the Oklahoma Geological Survey (website: <http://www.ogs.ou.edu/>) is listed here:

Stanley Group, Mst, Mississippian:

Lands in McCurtain County near Broken Bow Lake -- From: Marcher, Melvin V., and DeRoy L. Bergman, 1983, Reconnaissance of the Water Resources of the McAlester and Texarkana Quadrangles, Southeastern Oklahoma [Geologic Map]: Oklahoma Geological Survey Hydrologic Atlas #9 "Shale, olive-green to gray, illitic, chloritic, with many 5- to 30-foot-thick beds of poorly sorted, micaceous, quartzose sandstones and some thin siliceous cherty beds and black shales; several tuff beds occur in basal 1,000 feet and are indicated by red line [on the geology map] in Stanley exposures exposures as designated on [the geology] map; many asphaltite, lead, and quartz veins occur along fault zones; mostly Chesterian age; thickness, 7,500 to 14,000 feet or more."

Atoka Formation From: Suneson, Neil H., 1991, Geologic Map of Blackjack Ridge Quadrangle, LeFlore County, Oklahoma: Oklahoma Geological Survey.

Atoka Formation, Pa: Pal Pam Pau, Lower Middle Upper Atoka Pennsylvanian:

"Predominantly poorly exposed, olive -gray (5Y3/2) to olive-black (5Y2/1), slightly silty, noncalcareous, poorly laminated shale and mudstone. Stratification in some beds contorted. Some beds have sheared appearance, and shale fragments have well-developed "sheen." Locally fissile, weathers to "flaky" appearance. Contains rare sandstone and siderite pods or concretions elongate parallel to bedding. Some beds exhibit "pencil" structure. Contains many thin beds of laminated siltstone and very fine-grained sandstone and rare beds of dark-colored siliceous siltstone. Also contains less common, moderately well exposed sandstone beds as much as about 20 m thick. Sandstone typically is light-olive-gray (5Y5/2), yellowish-gray

(5Y7/2), to medium-light-gray (N6). Mostly very fine-grained to moderately fine-grained and silty, poorly to moderately sorted, and noncalcareous. In southern thrust sheets, the basal 1500 m (4800 ft) appears to be locally medium-grained or bimodal with medium-sized grains supported in a fine-grained matrix. Based on hand-specimen examination, sandstones generally composed of about 95% quartz, 2-5% feldspar and rock fragments, and conspicuous white mica parallel to laminations; quartz rarely less than 75% or greater than 98%. Individual beds mostly vary from several centimeters to several meters thick and average about 60 cm. Amalgamated beds common, forming resistant ridges and dip slopes easily identifiable on aerial photographs; these marker beds are mapped. Thicker beds are generally unstratified (corresponding to Ta of Bouma sequence) grading upwards to parallel-laminated (Tb); some beds exhibit low-angle, moderate- to long-wavelength, undulatory stratification similar to incipient dish-and-pillar or slump structures. Thinner beds commonly are ripple cross-laminated (Tc). Dish-and-pillar structures common. Sole marks (flute, groove, and load casts, trace fossils) at base of sandstone beds locally common. (Sole marks more common than in Jackfork Group sandstones.) Some beds have planar or slightly undulatory bases. Tops of sandstone beds typically grade upwards to siltstone; ripples or irregular tops caused by dewatering or slumping less common. Unfossiliferous except for local concentrations of plant debris on bedding planes throughout the formation and brachiopod and crinoid fossil fragments in rare beds in the lower part of the formation, particularly in the eastern part of the quadrangle. Porosity typically is very low except where medium-grained, fossiliferous, and/or moderately sorted. Sandstone beds typically weather to platy or blocky appearance; rarely vuggy; maximum exposed thickness approximately 2,100 m (7,000 ft); top not exposed." *Units Present North of Choctaw Fault*

Atoka Formation From: Mazengarb, C. and L.A.Hemish, 1993, Geologic Map of the Hontubby and Loving Quadrangles, LeFlore County, Oklahoma: Oklahoma Geological Survey Open File Map.

Atoka Formation, Pa: Pal Pam Pau, Lower Middle Upper Atoka Pennsylvanian:

"Predominantly poorly exposed, olive gray (5Y3/2) to grayish-olive (10Y4/2), slightly silty, noncalcareous shale (Pa) containing sideritic nodules. Includes numerous, continuous to discontinuous, ridge-forming moderate-yellowish-brown (10YR5/4) to dark-yellowish-orange (10YR6/6), very fine grained, silty, micaceous sandstones (Pass) containing plant fragments, sole markings, and trace fossils. Includes grayish-black (N2), fissile shale beds, and two unnamed coal beds in upper part. Sandstone units variable in thickness, generally thinly parallel-bedded with interstratified siltstones and shales; commonly ripple-marked; contacts usually gradational. Approximately 7,500 ft (2,300 m) exposed north of Choctaw fault." *Units Present South of Choctaw Fault*

Atoka Formation, Pa: Pal Pam Pau, Lower Middle Upper Atoka Pennsylvanian:

"Predominantly alternating sandstone and shale (mudstone) sequence dominated by shale. Shale is olive-gray (5Y3/2) to grayish-olive (10Y4/2), slightly silty, noncalcareous, and poorly laminated. Single siliceous shale bed, 1.2 in. (3 cm) thick (marked on map). Sandstone is light-olive-gray (5Y5/2) and yellowish-gray (5Y7/2) where fresh, and grayish-orange (10YR7/4) where weathered. Mostly fine-grained, rarely medium grained, poorly to moderately sorted, noncalcareous, and composed predominantly of quartz, with minor feldspar, lithic fragments, and conspicuous white mica. Sandstone beds vary from several inches to several feet thick and average about 2 feet (60 cm). Amalgamated beds are common, forming resistant ridges and dip slopes, some of which are depicted (as marker beds) on the map. Sandstones, which are interpreted as turbidites, contain well developed sedimentary structures, including impressive sole structures (flute, groove and load casts, trace fossils), parallel and ripple cross lamination, and water expulsion (convolutions, dish and pillar) features. The formation is absent of macrofossils except for local concentrations of plant fragments on bedding planes. Thickness of the formation is uncertain, but a minimum 10,600 ft (3,200 m) is estimated. Maximum exposed thickness south of Choctaw fault approximately 11,000 ft (3,400 m); top not exposed."

Hartshorne Sandstone, Phs, Lower Des Moines Pennsylvanian: The Hartshorne Sandstone consists mostly of sandstone, with some siltstone, shale, and at least two economically important coal beds. The Lower portion consists of dense, massive, though usually thin bedded, gray sandstones, which are somewhat shaley. The interbedded shales are thin, silty, and gray. The middle portion of the unit consists of about 50 feet of gray platy shales. The Upper 75 feet of the unit consists of thick, generally massive, gray to brown sandstones. The total thickness of the unit varies from 100 to 400 feet in Arkansas and Oklahoma, but is usually about 225 feet thick in Oklahoma. The upper and lower Harshorne coal beds are among the most important in southeastern Oklahoma. These beds are mapped as part of the Hartshorne Sandstone Formation in Oklahoma and as part of the McAlester Shale Formation in Arkansas. In Oklahoma, the Hartshorne coal beds near Heavener, Oklahoma just north of the Choctaw Ranger District, together measure from 5 to 7 feet thick. These beds, along with beds from other formations, are part of the federal coal reserves identified by the Bureau of Land Management and the Oklahoma Geological Survey for the "Southeast Oklahoma Planning Unit."

From: Hemish, L.A. and Colin Mazengarb, 1992, Geologic Map of the Summerfield Quadrangle, LeFlore County, Oklahoma: Oklahoma Geological Survey Open File Geologic Map.

Savanna Formation, Psv, Upper Des Moines Pennsylvanian: "Predominantly pale-yellowish-brown (10YR 6/2) to olive-gray (5Y 3/2) to medium-dark-gray (N 4) shales (Psv) with several mappable moderate-brown (5YR 4/4) to grayish-orange (10YR 7/4) to moderate-reddish-brown (10R 4/6), fine to very fine-grained, noncalcareous sandstone units (Psv1, Psv2, Psv3, Psv4, Psv5, Psv6, Psv7). The sandstones are massive to thin bedded and shaly. They commonly are cross bedded and ripple marked and in places contain abundant soft-sediment deformation features. Sole marks (trace fossils; brush and prod marks; flute, groove, and load casts) at the base of some sandstone beds are locally common. Psv 1 is mappable only in the north-central part of the area. It forms a low ridge east of Little Caston Creek for a distance of about 1 mile, but then disappears under the alluvium of Caston Creek. Where exposed, the base of Psv1 marks the base of the Savanna Formation. Just west of Caston Creek, in the SW 1/4 sec. 30, T.6N R.23E., a thin (0.2 ft), fossiliferous, marine limestone is exposed in a shale interval below Psv2 in approximately the same position stratigraphically as the Spaniard Limestone Member of the shelf area of northeastern Oklahoma. The base of the Spaniard Limestone marks the base of the Savanna Formation in the shelf area. The marine limestone in sec. 30 is tentatively correlated with the Spaniard Limestone. In the absence of Psv1 in the area west of Caston Creek, it marks the base of the formation. A second marine limestone occurs in the stratigraphic interval between Psv2 and Psv3, approximately in the same position as the Sam Creek Limestone Member of the shelf area. It is predominantly olive-gray (5Y 4/1), to light-brownish-gray (5YR 6/1), to dark-yellowish-brown (10YR 4/2), impure, silty, fossiliferous, and about 1.2-1.6 ft thick. It is tentatively correlated with the Sam Creek Limestone of the shelf area. Psv2 thins markedly east of Caston Creek. Psv4 is thin and shaly and mappable for a distance of only about 2 miles. All Psv sandstone units locally contain shale beds. Most shales include thin, unmappable sandstone units. The Cavanal coal bed (20-22 in. thick) occurs in the shale interval just below Psv5. Thickness is 1,400-1,600 feet."

Goodland Limestone, Kg/Kgw, Lower Cretaceous Tiak RD: The Goodland Limestone (Kg), part of the Fredericksburg group, overlies the Antlers Sandstone (not exposed in this area) and is well exposed and readily identifiable, particularly along Little River. It consists of a thick, irregularly bedded, chalky white, fine-grained crystalline limestone, and erodes into a mappable escarpment. The lower limestone is white on fresh surfaces, and gray, pale orange, or pale blue on weathered surfaces. The dense upper limestone is oolitic in places. It is grayish white to pale orange where unweathered and sooty gray on weathered surfaces. The formation is abundantly fossiliferous, containing pelecypods, gastropods, echinoids, and ammonites. The Goodland

Limestone ranges in thickness from about 28 to 95 feet, and is about 50 feet thick near Idabel. Some argillaceous buff beds in the lower few feet may be "Walnut Clay" (Kw) equivalents. These units may be mapped together as the "Goodland Limestone and Walnut Clay" (Kgw). The Goodland Limestone apparently does not yield much water to wells, and the water is of poor quality.

Kiamichi Formation, Kk, Lower Cretaceous Tiak RD: The Kiamichi Formation, part of the Fredericksburg group but often mapped with the Washita group, overlies the Goodland Limestone. It is dark-gray to black shale with some brown fossiliferous limestone. Thickness of exposed strata is as much as 28 to 36 ft. increasing to 80 ft. in the subsurface of McCurtain County. The upper boundary of the Kiamichi has not been delineated in Southern McCurtain County and the formation is included with the rocks mapped as "Washita." The Washita group including the Kiamichi formation consists of relatively thin beds of highly fossiliferous gray limestone alternating with thick beds of unconsolidated clay. The lower part of the limestone beds are compact, bluish gray to white, and highly fossiliferous. In the upper part, the limestones are softer, thicker bedded, gray or yellowish tan, and somewhat less fossiliferous than the lower part. Thin beds of clay separate some of the limestone beds and thicker beds of clay shale separate others. These beds of clay shale are mostly dark blue or black, weathering to light gray, yellow, and various other colors. The clays and clay shales are calcareous and commonly sandy. The thickness of the Washita ranges from 20 feet to about 200 feet in Southern McCurtain County. The unit contains relatively small amounts of water, primarily associated with the limestone, which is reportedly of poor quality.

Woodbine Formation, Kwbt Kwbs, Lower Upper Woodbine Upper Cretaceous Tiak RD: The surface exposures of the Woodbine form low, rolling hills that are covered with a thick mantle of red sand loam. The lower, tuffaceous, member of the Woodbine consists principally of highly cross-bedded coarse poorly consolidated dark green tuffaceous sand that weathers yellowish green to yellowish red and locally is cemented by calcite into balls or lenses. Interbedded with the sand is brownish-red clay. At the base in a few places is a white sand. Also included are a few gravel lentils, some of them rather extensive. The clays are lenticular and occur throughout the member, but are most abundant in the upper part. Typically the clays are brownish red, but at places they are red. The clays are almost entirely noncalcareous. The lack of calcium carbonate and the reddish color of the clays differentiates them from the clays in the underlying Washita. The upper member of the Woodbine formation is composed principally of gray to brown cross-bedded sand and sandy gravel with some brown or reddish-brown clay lenses. Field investigations over much of the exposure of the Woodbine on the Tiak district failed to show any evidence of gravel, probably because only the lower member is exposed. Thickness of the Formation ranges from 155 feet to about 455 feet increasing eastward. As a consequence of its thickness and southerly dip, the outcrop zone locally approaches 5 miles in width from north to south. The formation is not a productive aquifer and the water quality is reported to be poor, but capable of producing adequate supplies for stock animal uses.

Tokio Formation, Kt Kto, Upper Cretaceous Tiak RD: strata of the Tokio Formation crop out in a band as wide as 11 miles just south of the Woodbine, and are composed of gravel, light gray quartz sand, and clay shale. The sands are cross-bedded and poorly sorted, at many places are argillaceous, and weather to brown, red, or a mottled color. In some exposures small, hard plates cemented with iron weather out of the sand; in other exposures, the sand is massively bedded and weathers to a soft, sandy soil. The clay shales are generally gray and at many places have dark brown or black streaks caused by iron and manganese staining. The cross bedding, together with petrified wood, poor sorting and local, intraformational unconformities, indicates that the Tokio is a product of shallow, near shore environment. Thickness ranges from 88 to 380 feet thickening southeastward. Water yield from this formation is reported at less than 20 gallons per minute. A peculiar feature of the Tokio is the presence of cylindrical pipes or conical structures. These are erratically distributed, bunched at some places and widely

scattered at other, being most abundant about 3 miles south of Haworth. They reach a maximum length of more than six feet and are perpendicular to the bedding planes. They range in diameter from 0.1 foot to 0.7 foot. Some even have pipes within pipes. Their mineral composition is identical with that of the surrounding beds, but the pipe filling lacks stratification and is lighter in color. A hard, ironstone-like shell causes them to weather out as small knolls or humps.

Ozan and Brownstown Formations, Undifferentiated, Kob, Upper Cretaceous. Tiak RD: The Brownstown Marl Formation (Kbr) is comprised of marl and clay, gray, calcaceous, micaceous, sandy, and fine-grained sand, with some interbedded chalky limestone, and has a total thickness of about 100 ft. The Brownstown Marl formation is exposed in the Pine Creek and McKinney Creek area in the extreme southeastern portion of the Tiak District, in conjunction with the overlying Ozan Formation. The Ozan Formation (Ko) is marl and clay, light- to dark- to brownish-gray, micaceous, calcareous, sandy and fine-grained sand, with interbedded chalky limestones. Clauconitic marl and sand are at the base of the Ozan Formation, and its total thickness is about 100 ft. Together, the strata of the Ozan and Brownstown Marl Formations (Kob) form an escarpment that rises as much as 30 feet above the Tokio Formation to the north and as much as 60 feet above the alluvial deposits to the west and south. The limestones and marls are light gray to white on both fresh and weathered surfaces. Small black particles, about the size of very fine sand, along with a few small pebbles, are sparsely scattered through the limestone. The limestone weathers into angular or nodular boulders and cobbles because of vertical and horizontal jointing. The joints are weathered brown at most outcrops. The clays are light gray to brownish gray and contain a few brown iron stains. Mica and sand in the clay cause it to be flaky. Thickness of the unit has not been determined, but it may be as much as 195 feet thick. Reportedly, only enough ground water is yielded from this unit for domestic use.

Terrace Deposits, Qt, Quaternary Pleistocene: Terrace deposits are described as containing gravel, sand, silt, clay, and some volcanic ash generally situated at several levels 20 to 160 feet or more above present flood plains, with each level containing deposits that average 20 to 30 feet in thickness. Some have windblown sand on top. The terrace deposits are positioned on the uplands between stream valleys. These deposits may also include colluvial wash on the sides of hills. Whereas there is little question about the origin of the alluvium deposits, that of the terrace deposits is not always clear. Situated as they are at several levels above present stream action, and containing materials such as volcanic ash, which is not obvious in the alluvium, they must have originated before the current alluvium deposits. The extent to which they are residual, transported or colluvial materials or a mixture thereof has not been determined. The terrace deposits in McCurtain County, Oklahoma, are reported to yield only enough water for domestic and stock use.

Alluvium, Qal, Quaternary Holocene: Alluvium is gravel, sand, silt, and clay, including low terraces generally about 30 feet above stream channels, associated directly with stream bottoms and floodplains as the obvious product of the regime of these streams. Alluvium deposits can vary widely in thickness. For example, on the Tiak Ranger District, the alluvium is about 50 feet thick along Little River and 110 feet thick along Red River. The alluvium deposits in McCurtain County, Oklahoma, are reportedly capable of yielding several hundred gallons of water per minute at some locations.

OGS Open-File Maps: Blackjack Ridge Quadrangle, LeFlore County, Oklahoma by Neil H. Suneson, 1991; Hodgen Quadrangle, LeFlore County, Oklahoma by Neil H. Suneson and Leroy A. Hemish, 1993; Hontubby and Loving Quadrangles, LeFlore County, Oklahoma by Colin Mazengarb and Leroy A. Hemish, 1993; LeFlore Quadrangle, Latimer and LeFlore Counties, Oklahoma by Leroy A. Hemish, 1991; LeFlore SE Quadrangle, LeFlore County, Oklahoma by Leroy A. Hemish and Neil H. Suneson, 1991; Red Oak Quadrangle, Latimer County, Oklahoma by Leroy A. Hemish, Neil H. Suneson and Charles A. Ferguson, 1990; Summerfield

Quadrangle, LeFlore County, Oklahoma by Leroy A. Hemish and Colin Mazengarb, 1992; Talihina Quadrangle, Latimer and LeFlore Counties, Oklahoma by Neil H. Suneson and Charles A. Ferguson, 1990; USDA, 1967, Geologic Map of LeFlore County Oklahoma: USDA, Soil Conservation Service, Stillwater, Oklahoma.

Oil and Gas Reasonably Foreseeable Development Scenario

From: USDA Forest Service and USDI Bureau of Land Management
(BLM Jackson, Mississippi and Tulsa, Oklahoma Field Offices)

(originally developed for 1990 Ouachita National Forest Plan, updated by the BLM in 2004)

Oil and Gas: Geophysical Exploration, General

Hydrocarbons occur in association with water in porous sedimentary rocks such as sandstone. Since petroleum and natural gas are less dense than water, they rise until trapped by a barrier, usually an impermeable rock layer. The likelihood of the presence of oil and gas is often determined by geological prospecting. Such prospecting can be done on the ground, where off-road vehicle travel may be necessary, or by aerial survey. Photographs from orbiting satellites have also been used to identify surface structure. Subsurface geology is not always accurately indicated by surface outcroppings. To verify surface indicators and to map the subsurface structures, geophysical exploration is used. An issued oil and gas lease is not required for geophysical exploration to occur; it may be permitted prior to or subsequent to leasing. Exploration activities may occur across the same area many times and continue over a period of years.

There are three types of geophysical exploration -- 1. gravitational field, 2. magnetic field, and 3. seismic characteristics. These are discussed as follows:

1. Gravitational prospecting detects variations in gravitational attraction caused by the differences in the density of various types of rock.
2. Magnetic prospecting often replaces or is used to supplement gravitational work. Magnetic methods reveal buried structures (likely to yield oil and gas) because such structures show a strong magnetic response. The only surface disturbance is that caused by the vehicle used to transport gravitational and magnetic prospecting equipment.
3. Seismic prospecting is the most popular geophysical method on the Ouachita National Forest since it gives the most reliable and reproducible results. Generally, geophysical seismic lines are run on wide spacing intervals and are narrowed and concentrated in smaller geographic areas as the target area is better defined. A separate permit is issued by the Forest for each geophysical request, and it will include specific mitigating measures for public safety warnings, wildlife concerns, property protection (fences, wells, buried utility lines, etc.), and site reclamation.

There are a number of geophysical exploration methods. The least impactful include gravity and magnetic surveys and consist of taking readings at regular intervals across the land from either hand held instruments, ground vehicles, or aircraft. No actual surface disturbance is involved unless off-road vehicle travel is used to reach survey points. These methods are used to get subsurface information over a large area. If promising structures are found, other exploration techniques are then used to further define and locate possible traps and structures containing hydrocarbons. One of these, "vibroseis," uses large trucks equipped with metal plates that are lowered from beneath each vehicle to the ground. With the entire weight of the truck resting on the plate, a hydraulic system vibrates the plate and transfers the energy into the ground to be picked up by the seismic detectors (geophones) arrayed along the line of survey. An instrument truck equipped with a seismograph records the seismic information. Two to eight trucks are used in tandem. Unless the topography is relatively flat and open, the trucks are

restricted to existing roads and trails. Little resource disturbance occurs with this type of geophysical exploration.

Another way to impart energy into the ground for the seismograph to record is the use of explosives. This can be accomplished by setting off charges in a hole or on the surface. Conventional seismic exploration drills 4-inch diameter holes to depths of 50-200 feet. An explosive is placed in each hole and detonated with the resulting shock waves recorded by geophones and passed on to the seismograph. The shot holes are made using a truck-mounted drill capable of driving across country. Although no roads are usually built to accommodate these vehicles, they can create trails that result in some soil compaction and movement and vegetation loss. All shot holes are required to be plugged on the Forest. Surface charge seismic involves placing explosive charges on the ground or above ground attached to wooden stakes some three feet high. Once the charges are detonated, geophones strung along the line of survey pick up the vibrations and channel them to the seismograph for recording. Most work is accomplished by hand labor with vehicle access needed only for the instrument truck.

Resource impacts include mowing grass and underbrush within the point of explosive effects. Usually, this is a 5-foot circle around the point of detonation, but it varies depending of the size of the charge. Leaves will also be stripped off of trees within this zone. The noise of the explosions will cause some wildlife displacement and can be heard by people in the area. In difficult terrain, both explosive methods may be done using helicopters to ferry people, materials, and instruments to the detonation points along the lines of survey. This eliminates surface impacts resulting from vehicles, but it adds to the noise factor. The shock waves, initiated by using a thumper/vibrator on the surface, or explosives in the bedrock, travel through or are reflected from various rock layers and are received by shock sensor equipment. The sensors are connected to a truck or portable station where the shock waves are recorded. The time required for shock waves to travel through the rock formations yields useful information. The most common seismic prospecting is surface detonations. Two-to-five pound explosive charges are detonated in clusters (generally 25 two-pound charges or 10 five-pound charges.) Geophones are used to "hear" the seismic reflections and are strung out in long lines extending over the survey area. Each geophone picks up the signals and they are recorded on sensitized paper and on magnetic tape.

Oil and Gas: Geophysical Exploration, Application

All individuals and organizations such as the lessee, a geophysical contractor, a geochemical contractor, or a government agency wishing to conduct exploration activities on National Forest System lands must submit an application for a permit to the appropriate District Ranger responsible for the Forest lands upon which the activity is to take place. This application may take several forms, but it must contain sufficient information relating to the location and nature of the proposed operations to allow the Forest Service issuing office to properly evaluate them.

Oil and Gas: Geophysical Exploration, Analysis and Decision Making

An environmental analysis is conducted on exploration proposals prior to permit approval and permit issuance in accordance with the provisions of Title 40 of the Code of Federal Regulations, Parts 1500 to 1508 (Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act.) The appropriate level of analysis and type of NEPA documentation will be based on the nature and scope of individual proposals. Records compiled during the analysis must as a minimum be retained in the permit file(s) maintained at the Ranger District office administering the permit as delegated in FSM 2821.04. The analysis identifies the reasonable and necessary mitigation (stipulations) that, if approved, would be attached to the prospecting permit (Form FS-2800-1).

It is not a prerequisite to have an oil and gas lease to conduct exploration activities on the Federal mineral estate. The lease only provides the right to produce the minerals. On existing issued leases, the lessee, along with every other citizen of the U.S. who has the necessary bonding and permits, has the right to explore his leasehold. As most geophysical or geochemical survey methods constitute a temporary or casual use of the surface, any surface occupancy provisions of the lease terms do not directly apply to the terms and conditions of the prospecting permit. However, the surface resource or use concerns identified in the leasing analysis may, depending upon the nature of the exploration survey proposed, identify possible mitigation needs or management concerns. If the exploration proposal results in surface impacts requiring reclamation, clean up, shot-hole plugging, or other resource damage, an acceptable reclamation performance bond is required prior to permit issuance. The responsible Forest official ascertains if the applicant has an acceptable bond or cash deposit in lieu of bond for the proposed survey, or if the applicant has a Region-wide blanket bond on-file with the Regional Office in accordance with the provisions of FSM 6506.82.

Oil and Gas: Exploratory Drilling

When sufficient information is obtained by industry on the geologic resource, a "drill/no drill" decision is made. Geological and geophysical investigations provide valuable information on the potential for the occurrence of an oil and gas field. Based on this information, lands are leased or cooperative agreements are signed with adjacent lessees (on leased lands) to establish control over the lands within the potential field. Oil and gas operations are discussed for three phases: exploratory drilling, field development, and abandonment and reclamation. These phases are not clear-cut operational phases with distinct starting and ending points. This is especially true for distinguishing between exploration and field development. Frequently, a decision to develop a field cannot be made based on the results of a single, successful well. Additional exploratory wells may be needed for industry to make a decision on whether to develop the field. These additional wells can also provide meaningful information for land managers to help analyze potential impacts of field development and to make decisions based on more accurate information. In reality, few leases ever have geophysical exploration, much less drilling, occur on them. On average, about 90 percent of wells drilled are dry holes.

Before an exploratory (wildcat) well is drilled, the company organizing the drilling venture establishes a controlling interest in leases for all lands in and adjacent to the potential field area. Unitization is the uniting of all leases into a joint venture to operate under a cooperative or unit plan. Once the unit agreement is approved, all operations within the unit area are administered as if there were a single lease (43 CFR 3180).

Oil and gas leases are issued with stipulations to protect other resources. These stipulations authorize federal agencies to restrict oil and gas activities on the lease under certain conditions. The use of appropriate discretion, on a case-by-case basis, to enforce restrictions contained in the lease is the responsibility of the federal agencies. Exceptions to lease stipulations may be approved for a site-specific proposal based on an analysis of the proposal and the need for the lease stipulation to be enforced. If a stipulation is not needed to protect the resource for which it was designed, the stipulation may not be enforced because the restriction serves no purpose in and of itself. However, the inability of the leaseholder to conduct operations within the terms of the lease may be grounds for denial or delay of a particular proposal. The level of analysis and documentation associated with the approval of an exception to a lease stipulation varies. Generally, an exception would be approved if it can be demonstrated that the impacts of a proposed action can be acceptably mitigated or that the impacts to the resource protected by the stipulation would be similar whether or not the exception were approved.

Industry's decision on whether to develop the field is essentially an economic one. This decision depends, at least in part, on the type of hydrocarbon present, i.e., oil or gas, the size and

productivity of the geologic structure and formation, the price of oil or gas, and marketability. In some cases, a discovery may not be fully developed although production may take place to recoup some of the costs of exploration. The initial wildcat (exploratory) well is authorized under an Application for a Permit to Drill (APD). Procedures for submittal of an APD are contained in "Onshore Oil and Gas Order No. 1" issued under Title 43 of the Code of Federal Regulations, part 3164, by the USDI, Bureau of Land Management. After this well is completed, subsequent activities may include additional exploratory or confirmation wells to locate and confirm the presence of an oil and gas reservoir. Once the presence of such a reservoir is confirmed, industry may decide to pursue development of the reservoir (field) to fully extract the resource. When sufficient development wells are completed, the production phase to extract, collect, and transport the resource to the marketplace is initiated to get a return on the investment. Depending upon reservoir characteristics that affect the flow of oil and gas to the wellhead, additional development wells are drilled to extract the oil and gas.

Drilling for gas on the Ouachita National Forest:

- Up to 1989 – five wells drilled in T2N R32W Secs. 3&8, T3N R27W Sec. 1, T4S R25W Sec. 25, T5N R22W Sec. 32, all in Arkansas. Hydrocarbon discoveries reported from several of these wells. None were producers, and consequently all were plugged and reclaimed.
- 1990-1992 – five wells total: two wells drilled in Arkansas in T5N R22W Sec.33, T4N R26W Sec.18, and three wells drilled in Oklahoma in T4N R24E Sec.14, T5N R24E Sec.31, and T4N R23E Sec.10. Hydrocarbon discoveries reported from several of these wells. None were producers, and consequently all were plugged and reclaimed.
- 2000-2001 – two wells drilled in Oklahoma in T4N R23E, Secs.9 and 10. Both wells were plugged and reclaimed.
- 2002-2004 – Access to private mineral estate (Outstanding Mineral Rights) under Federal surface resulted in the drilling of one set of wells for coal bed methane and proposals at the time of this writing for an additional 6 more on the Poteau Ranger District in T4N R32W Sec.32 (Arkansas). The one coal bed methane well drilled in 2004 is a producer. Of the 6 more coal bed methane wells currently under consideration, at least one is anticipated to be drilled in 2005.

Oil and gas exploration on the Forest as specified in the approved APD may include road construction, clearing all vegetation from a one- to three-acre pad site for shallow wells and from four- to six-acre pad site for deeper wells, leveling and shaping of the drill pad site, and transportation and set up of the drilling equipment (drill rig, mud pumps, generators, pipe racks, tool house, and other facilities). Surface disturbance resulting from road and pad construction impacts soil, vegetation, and water resources. Topsoil is stripped and stockpiled for later use in site rehabilitation, but the associated vegetation and vegetative site productivity is lost until then. Some erosion of the exposed surface and sedimentation of streams may result. Wildlife and livestock will be displaced to some extent by the noise and activity at the well location. Air quality reduction from dust will occur locally along unsurfaced roads. If the well is drilled in a previously undeveloped area, this may change the opportunity for dispersed non-motorized recreation to motorized because of the new road.

Approximately 5,000 to 15,000 gallons of water a day may be needed for mixing drilling mud, cleaning equipment, and cooling engines. Water sources may be from wells or streams. Drilling depths on the Forest range from 3,000 feet to 17,000 feet. Transporting and setting up a drill rig capable of reaching the deepest zones requires an access road sufficient to handle the 30 to 40 semi-trucks and trailers of heavy equipment and a daily traffic of 20 to 30 vehicles. A level drill pad of, generally one- to four-acres in size, is needed to set up and operate the rig. Usually, the dimensions of a pad measure 380 by 250 feet (2 acres), but this may be modified based on the natural contours of the land and the other resource values involved. All of the pad must be placed on a "cut" rather than "fill" surface for reasons of safety and rig stability. Once the rig is

set up, drilling usually takes place on a 24-hours/day, seven-days/week basis. Additional standards are contained in "Surface Operating Standards for Oil and Gas Exploration and Development" prepared jointly by the Forest Service and the Bureau of Land Management.

Approximately 30 personnel are needed in drilling a typical well. Drilling may take from 1 to 18 months (typically no more than 3 months) to complete depending on the depth to be drilled. If no economic quantities of gas or oil are found it is considered a dry hole and the facilities are removed and the well pad is reclaimed as described under "Abandonment and Reclamation." The access road is also reclaimed unless it is needed for other purposes in conformance with the Forest Plan.

Oil and Gas: Field Development and Production

If a wildcat well is successful or the geologic information gained from the well log warrants additional exploration, additional exploratory wells may be authorized, on a case-by-case basis (prior to field development), to obtain sufficient information about the hydrocarbon reservoir to make plans to develop the field. After completion of these confirmation wells, there should be sufficient information available from the operator to predict the level of future activity. This appraisal includes information as to the extent of the field, initial and fill-in spacing of wells, need for tank batteries and/or pipelines, power lines, and scheduling of future operations. From this information, an environmental analysis is completed for the potential impacts of the field development and production activities, the need for a transportation plan and utility corridors, and adjustments in the Forest Plan. Before any actual drilling can commence, the operator must have an approved Application for Permit to Drill (APD), which must have gone through the NEPA process. As part of the federal approval process any mineral activity is subject to the environmental analysis requirements of NEPA and the implementing regulations of the Council on Environmental Quality.

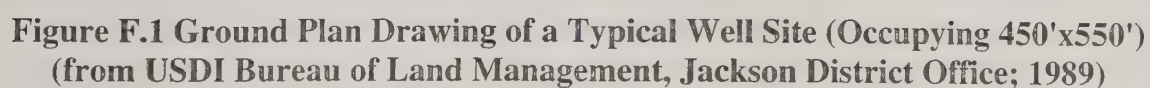
Once an operating plan is submitted, BLM and the USFS would complete an environmental analysis on all aspects of the proposal. As required by NEPA, the environmental review would include a formal process for identifying public and agency concerns regarding a mineral proposal. The environmental analysis would specifically address the potential environmental impacts of the proposal and its alternatives. The environmental analysis would be documented in an EA or an EIS, depending on the scope of the proposal, which would be distributed for public and agency comment as part of the BLM and USFS decision making process. The procedures for drilling development wells are about the same as for exploratory drilling except that there is less subsurface sampling, testing, and evaluation. Field development locations are surveyed and a well spacing pattern is established by the State with the concurrence of the BLM and Forest Service. The spacing of the wells from one another depends on the State's regulations and the type of hydrocarbon sought. Gas wells are usually spaced one per section (640 acres), but can be drilled in some circumstances as dense as 4 wells per section (every 160 acres) with oil wells often one per quarter/quarter-section (40 acres). In developed petroleum fields, there are about two miles of roads per section.

Development of Federal oil and gas resources provides a domestic source of petroleum to help offset the import of foreign oil and gas. Foreign imports now make up some 60 percent of the total United States use. The Federal government also receives significant rentals and royalties from leasing and production. States are given 50 percent of these monies from Public Domain status lands and 25 percent from lands with acquired status.

Oil and Gas: Abandonment and Reclamation

If the well is a dry hole, the site is re-contoured, the topsoil spread over the disturbed area, and seeding with native plants and grasses accomplished. If the well is a producer, that portion of

NOTE: A producing well will generate additional drilling to determine the size and extent of the field. With more producing wells there will be the need for facilities to produce, store, and transport the oil, gas, and water. Associated with this next phase are more roads (some upgraded to all weather travel), utility corridors for pipelines and power lines, and space for fluid storage tanks and oil/water separators.



Reasonably Foreseeable Development Scenario for Gas and Oil

This section discusses the reasonably foreseeable development of potential gas and oil resources on the Ouachita National Forest. It has been developed by the USDI, Bureau of Land Management Jackson District Field Office of the Eastern States Office (Arkansas lands), and the Tulsa District Office of the New Mexico State Office (Oklahoma lands) for the Forest Plan. This information is divided into: 1) Development in the Reasonably Foreseeable Future; 2) Typical Drilling Scenario and Well Design (*Ground Plan Drawing of a Typical Well Site*); 3) Cumulative Impact of Projected Future Development (*a. Chart on "Approximate Area Disturbed from Drilling," b. Chart on "Approximate Area Disturbed from Production," Summaries of the net cumulative disturbance of Drilling and Production*).

1) Development in the Reasonably Foreseeable Future. This assessment of the development in the reasonably foreseeable future is based on projections over the next 10 to 15 years using available data and professional judgment. This scenario is a baseline scenario. As such, the scenario projects development based on the assumption that all areas are open to development under standard lease terms except those areas closed by statute. This scenario is consistent with the prescriptions contained in the Final Environmental Impact Statement for the Revised Forest Plan. Scenarios were considered for the alternatives. However, in relation to the availability of National Forest lands for oil and gas leasing and the associated lease terms, relatively minor differences were identified between the alternatives, a sufficient and applicable projection for all alternatives. The mineral potential assigned for the production of oil and gas from the federal mineral ownership (FMO) in the Ouachita National Forest conforms to the rating system outlined in the Draft BLM Fluid Minerals Handbook H-1624-1 (DD 9/7/88). This system is designed to remain dynamic. As new data is received it can be used to change the rating. The ratings used have four levels: high, moderate, low and no potential. These are defined as:

- *High Potential:* Geologic structures and formations highly favorable for the accumulation of oil and gas are known to exist, includes areas previously classified as Known Geological Structures (KGS).
- *Moderate Potential:* Many favorable non-producing geologic structures and formations are present, but not all potentially productive formations have been drilled and tested.
- *Low Potential:* Geologic structures and formations are well defined, and potentially productive formations have been drilled, tested, and failed to produce oil and gas.
- *No Potential:* Geologic structures and formations are present, but the potential for oil and gas accumulations does not exist. These areas contain geologic formations that do not meet the present criteria for oil and gas accumulations; that is, there are no source rocks, porosity and permeability have been developed (except for fractures), and no traps are thought to be present.

Little data is available to the federal agencies concerning the structures and reservoir characteristics of potential gas plays in the Ouachita National Forest. Petroleum companies hold most of the existing data confidentially. The timing of the drilling and the areas receiving the greatest attention is difficult to predict. This is dependent on the oil and natural gas market values; the success rate of wells being drilled and those that will be drilled in the near future; and the perceived impact of the lease stipulations by the petroleum industry.

The Ouachita National Forest has 12 Ranger Districts (RD): 3 in Oklahoma and 9 in Arkansas. The three Ranger Districts in Oklahoma are the Choctaw RD and the Kiamichi RD in LeFlore County and the Tiak RD in McCurtain County.

- Choctaw RD, Oklahoma: The Choctaw RD is on the north side of the forest. The possibility that this area will be explored and developed in the future is medium to moderately high. The reason for this is that the Choctaw RD is on a geological trend with

ongoing activity to the west. The Spiro/Wapanucka zone has been found to be productive south of the Choctaw Fault when it is encountered on the structurally high, hanging wall side of individual thrust fault wedge zones. Discoveries have been made which prove that the depositional trend of reservoir quality Spiro sandstone extended further south than previously thought. In addition to this, the Arbuckle Formation has been proven productive near Wilburton, Oklahoma. This zone lies below the thrust sheet and is a fractured porosity reservoir. Since this production was discovered in 1987, there have been 20 wells drilled to the Arbuckle in a 12-township area. This is somewhat more area than that of the Choctaw RD. Generally, these wells are targeted for the Spiro/Wapanucka zone as well as the Arbuckle. This play relies heavily on geophysical exploration techniques, and each well has to stand on its own merit. It is expected that this play will move east into the Ouachita National Forest. Due to the nature of geophysical exploration, such as time involved, expense, and permitting, this movement is expected to be slow. However, it is highly likely that commercial quantities of natural gas will be encountered in the Choctaw RD as it lies between the Choctaw Fault and the Winding Stair Fault traces. It is believed by some that the Winding Stair Fault is the limit of potential production to the south.

- Kiamichi RD, Oklahoma: The northern part of the Kiamichi RD is still to the north of the Winding Stair Fault and; therefore, due to the previously mentioned reasons, has a medium potential for future development. Also, it is very likely that the southern portion will receive some attention if production is found in the northern section. Development will probably be much slower paced than in the Choctaw RD.
- Tiak RD, Oklahoma: There is very little production in the vicinity of the Tiak RD. There are a great number of dry holes in the vicinity. For this reason, it is believed that the Tiak RD has medium to low potential for development in the foreseeable future. The fact that production is very shallow, less than 500 feet, indicates that there is a possibility that some exploration will take place. Approximately 100,000 acres of lands in the Broken Bow, Oklahoma area was obtained by the Ouachita National Forest in 1996 through an exchange with Weyerhaeuser Timber Company. These lands now make up the bulk of the Tiak Ranger District. The potential rating for these lands is medium to low potential for development in the foreseeable future as well.
- Arkansas Ranger Districts: The nine Ranger Districts in Arkansas on the Ouachita National Forest are the Caddo, Cold Springs, Fourche, Jessieville, Mena, Oden, Poteau, Womble, and Winona Ranger Districts.
 - The Caddo, Jessieville, Winona, Womble, Mena and Oden Ranger Districts are considered to have low potential for the production of oil and gas.
 - The Cold Springs, Fourche, and Poteau Districts were assigned moderate potential for the production of oil and gas.

Geophysical data is not available to identify potential traps in the forest in Arkansas. However, an analysis of leasing activity, adjacent fields and conversations with oil and gas employees, both with industry and the State of Arkansas, indicates that three principal plays can be anticipated: the Atokan, Morrowan, and Arbuckle. After petroleum production is established in a field, additional wells will be stepped out. Drilling units contain 640 acres, and a fully developed field would have eight to twelve wells within its boundaries. Extending these plays from Oklahoma into Arkansas naturally increases the risk of dry holes. Several wildcats were drilled in southeast Oklahoma south of the basin fairway, but little has been done in Arkansas. In the late 1980s and early 1990s, interest increased in the overthrust belt (frontal thrust zone). The prospects during this last period of drilling were all located along the north edge of the Ouachita National Forest, north of the Choctaw Ross Creek Fault complex. These prospects were developed using seismic data with very little well control. None of the wells have penetrated the Arbuckle, and the data acquired, down to about 14,000 feet, was not encouraging. The ARCO Peeler Gap #1-32 drilled in Yell County, Arkansas, was plugged and abandoned at 13,919 feet in 1986, and the Oxy USA well drilled a mile from the ARCO well to a depth

of 23,000 feet from 1989 to 1991 (deepest well drilled in Arkansas) was also plugged and abandoned, both did not reassure those hoping for a discovery similar to the field found later at Wilburton Field. Porosity was low and no significant source rocks were noted.

- Coal Bed Methane on the Poteau Ranger District: Coal bed methane gas commonly associated with coal seams is present on that portion of the northwestern Poteau Ranger District partially underlain by a seam of coal. Production commenced on private lands immediately adjacent to the Forest in 2001 and on the Forest in 2004. At the end of 2004, one well on the Forest was completed and producing at the initial rate of 200,000 mcf (thousand cubic feet). Coal Bed Methane wells are typically short duration wells lasting 5 to 10 years when all the gas associated with a coal seam that can be recovered has been extracted. At the end of 2004, six more wells were being evaluated by the Forest. The mineral estate is all outstanding in third parties (non-Federal minerals).

2) Typical Drilling Scenario and Well Design in the Ouachita NF. To fully evaluate the impacts associated with projected oil and natural gas exploration and development on the forest, the types of activities typical of these actions must be identified and analyzed. Preparation for the drilling process includes construction of a drilling pad and reserve pit. Wells of 1,000 to 5,000 feet, typically associated with coal bed methane deposits and wells in the Arkoma Basin, will impact smaller acreage, with well pad sizes from one to three acres. Construction process for wells are essentially the same regardless of the wellpad size required for a typical operation. For a deep well (10,000 feet and deeper), pad sizes necessary to accommodate larger equipment will impact 3 to 6 acres.. Depending on the topography of the well site and access area, construction may require the creation of cut slopes and fill areas. An excavated reserve pit in this example is divided into two sections with total dimensions of 450 feet in length, 200 feet in width, and 10 feet deep and is lined with a plastic or butyl liner (or its equivalent) that meets minimum State standards for thickness and quality. Constructed access roads normally have a running surface (width) of approximately 15 feet and a right-of-way of 30 feet. The length is dependent upon the well site location in relation to existing roads or highways. The typical length of road construction will be about ½ of a mile or less. Because the cost of rig time in drilling a well is usually several thousand dollars a day, the drilling is conducted 24 hours a day when possible. The actual time to drill a well will depend on the depth of the hole, the number and degree of mechanical problems, if a well is a dry hole or a producer; etc. Material used in construction of the pads and access road (i.e., rock, shale, or gravel fill), when obtained from the Forest, is from sites that have been pre-approved by the District Ranger. Shale and/or gravel used in construction of the drilling pad shall be stockpiled or removed when restoring the area. For all surface-disturbing activities, the topsoil is removed and stockpiled for redistribution over the disturbed area prior to fertilizing and reseeding of the site. Restoration of the area normally includes reseeding of the area with natural vegetation, recontouring, and drainage control, as determined by the Forest Service. In the event production is established, pipelines and/or flow lines will be constructed in conjunction with the construction of the access roads whenever possible to minimize additional disturbance. Pipeline rights-of-way generally do not exceed 25 feet in width and will follow existing rights-of-way where possible. Exact right-of-way widths may be set by the surface management agency. Pipeline depth is usually at least 48 inches. When possible, a common point of collection shall be established to minimize the number of production sites. All pipeline designs, construction, operation, and maintenance comply with Federal Safety Standard for Gas Lines, Code of Federal Regulations, Part 192, Title 49, unless more stringent requirements are required by the surface management agency. Pipelines are immediately reclaimed once the pipe is placed in the pipeline trench.

3) Cumulative Impact of Projected Future Development. Cumulative impacts are determined based on assumptions and analysis of the reasonable foreseeable fluid mineral development in the Forest. The scenario includes estimates of the number of wells that may be drilled and the size of areas disturbed. These were determined by analyzing the previous petroleum activity on or near the Ouachita National Forest in Oklahoma where production is from similar age rocks, sedimentary environments, and trapping mechanisms. These impacts are outlined in the following paragraphs. These assumptions are necessary for a meaningful and reasoned analysis of the cumulative impacts resulting from oil and gas leasing and development. Discussion of how these assumptions were derived can be found in the previous paragraphs. The assumptions are based on an analysis of historic development and conversations with State and industry employees.

The oil and gas potential on the Ouachita National Forest is highly speculative, as very little drilling activity has occurred. As a result, the projections of future development must be viewed as a range of potential development rather than a single scenario. For example, if a strike is made, it is estimated that as many as 132 wells could be drilled on the Forest over a 10 to 20 year period to define and fully develop the fields. On the other extreme, several dry holes could condemn the prospects. The projection of activity over a range is intended to establish the boundaries of minimum versus maximum field development. The projected number of wells to be drilled on each Ranger District of the Forest has been projected based on three levels of drilling activity; low, medium and high. These are shown in the following table titled "Approximate Area Disturbed from Drilling."

NOTE: This information was originally developed by the USDI Bureau Of Land Management in the late 1980s for the 1990 Amended Forest Plan. It projected possible scenarios that might occur if the minimal exploration interest at that time were to continue through the planning period ending in 2005, and if production actually occurred in that period as well. In reality, exploration interest was sporadic at best, with only 3 wells drilled between 1990 and 2003 (1 on the Fourche RD and 2 on the Choctaw RD). All 3 wells were dry and were subsequently plugged, reclaimed, and abandoned. A fourth well drilled in 2004 specifically for coal bed methane is producing that commodity. Additional coal bed methane wells are anticipated to be drilled in 2005 and 2006. The coal bed methane on the Ouachita National Forest is considered to be short term and duration interest for the gas community. Such wells typically produce for only 5 to 10 years, and are dependent on coal seams. The coal seam on the Ouachita National Forest is located in the very northwest corner of the Forest in Arkansas, on the Poteau Ranger District in Sebastian County. The bulk of the coal seam and coal bed methane production is on adjacent private lands bordering the Forest. The area directly affected by the coal bed methane interests embraces approximately 6,000 acres.

The following projections were reviewed by the USDI Bureau of Land Management for this Plan and the next 10 year planning period. Given that the history of drilling on the Forest has resulted in no production (outside of coal bed methane), this information is retained for consideration in the event that drilling interest should ever possibly increase beyond the coal bed methane area. Some acreage adjustments were made based on Forest Service observations of actual operations on the Forest and adjacent areas.

Approximate Area Disturbed from Drilling

These projections are used in conjunction with the typical well design to calculate the anticipated cumulative impacts associated with drilling under each scenario. The following are assumptions that were used in this analysis: maximum area cleared per well site is 1 to 6 acres [most wells are 1 to 2 acres in size – an average 3 acres is used here]; access road average length per well is ½ mile, maximum width 30 feet with approximately 2 acres disturbed. The well pad for the dry holes will be reclaimed, and the roads will either be reclaimed or used as determined by the Forest Service. The total amount of disturbances actually occurs over the

years of field development. Wells will be abandoned and restored during the years of field development. The amount of disturbance per item of activity is to a large extent controlled by the Forest Service and the Bureau of Land Management.

Table F.2 Drilling Projections

Ranger District	Scenario	O&G Drilling Activity Producers (P) + Dry Holes (D)		
		Low	Medium	High
Choctaw	Number of Wells	8 (2P+6D)	25 (17P+8D)	50 (40P+10D)
	Well Pad	24 Acres	75 Acres	150 Acres
	Access Road	16 Acres	50 Acres	100 Acres
	Total	40 Acres	125 Acres	250 Acres
Cold Springs (North of Hwy 80)	Number of Wells	1 (D)	8 (5P+3D)	17 (13P+4D)
	Well Pad	3 Acres	24 Acres	51 Acres
	Access Road	2 Acres	16 Acres	34 Acres
	Total	5 Acres	40 Acres	85 Acres
Fourche (North of Hwy 28)	Number of Wells	1 (D)	11 (8P+3D)	22 (18P+4D)
	Well Pad	3 Acres	33 Acres	66 Acres
	Access Road	2 Acres	22 Acres	44 Acres
	Total	5 Acres	55 Acres	110 Acres
Kiamichi	Number of Wells	4 (1P+3D)	12 (6P+6D)	23 (15P+8D)
	Well Pad	12 Acres	36 Acres	69 Acres
	Access Road	8 Acres	24 Acres	46 Acres
	Total	20 Acres	60 Acres	115 Acres
Poteau (North of Poteau River)	Number of Wells	0	5 (3P+2D)	10 (7P+3D)
	Well Pad	0	15 Acres	30 Acres
	Access Road	0	10 Acres	20 Acres
	Total	0	25 Acres	50 Acres
Tiak	Number of Wells	2 (D)	5 (2P+3D)	10 (4P+6D)
	Well Pad	6 Acres	15 Acres	30 Acres
	Access Road	4 Acres	10 Acres	20 Acres
	Total	10 Acres	25 Acres	50 Acres
The Following Ranger Districts (or District portions) are projected to have no wells: Caddo, Cold Springs south of Hwy 80, Fourche south of Hwy 28, Jessieville, Mena, Oden, Poteau south of Poteau River, Winona, Womble				
Total Wells Projected		16	66	132
Total Producers and Dry Holes		3(P)+13(D)	41(P)+25(D)	97(P)+35(D)
Total Area Disturbed Well Pads		48 Acres	198 Acres	396 Acres
Total Area Disturbed Roads		32 Acres	132 Acres	484 Acres
Total Area Disturbed:		80 Acres	330 Acres	880 Acres

Approximate Area Disturbed From Production

The estimated area disturbed from a production scenario, under a low, medium, and high scenario within each Ranger District, is shown in Table F.3. In the event that production is established, a portion of the original drilling pad will be used for production facilities, reduced to a maximum area of ½-acre. The access roads constructed for drilling are used for production operations as well. Consequently, the figures for well pads and access road represent acreage that was disturbed as a result of drilling, not new disturbance. Flowlines/pipelines are placed in existing road right-of-ways, but may cross unroaded lands in some cases. The assumptions for this analysis are as follows: maximum area needed on a producing well (once drilling is completed) is ¼ to ½ acre (½ acre is used as the average); average length of access road is ½

mile and width is 30 feet (approximately 2 acres); average length of a gas gathering line (flowline/pipeline) from a producing well is about one mile and a width of 25 feet. For an average, these will be placed in existing roads rights-of-ways for at least half the distance resulting in average new construction for the other half (1 ½ miles; 1 ½ acres). Pipelines are immediately reclaimed after the pipe is placed in the pipeline trench.

Table F.3 Production Projections

Ranger District	Scenario	O&G Drilling Activity		
		Low	Medium	High
Choctaw	Number of producing wells	2	17	40
	Well Pad Portion	1 Acres	8.5 Acres	20 Acres
	Access Road	4 Acres	34 Acres	80 Acres
	Flowlines	3 Acres	25.5 Acs	60 Acres
	Total	8 Acres	68 Acres	160 Acres
Cold Springs (North of Hwy 80)	Number of producing wells	0	5	13
	Well Pad Portion	0	2.5 Acres	6.5 Acres
	Access Road	0	10 Acres	26 Acres
	Flowlines	0	7.5 Acres	19.5 Acres
	Total	0	20 Acs	52 Acres
Fourche (North of Hwy 28)	Number of producing wells	0	8	18
	Well Pad Portion	0	4 Acres	9 Acres
	Access Road	0	16 Acres	36 Acres
	Flowlines	0	12 Acres	27 Acres
	Total	0	36 Acres	72 Acres
Kiamichi	Number of producing wells	1	6	15
	Well Pad Portion	½ Acres	3 Acres	7.5 Acres
	Access Road	2 Acres	12 Acres	30 Acres
	Flowlines	1.5 Acres	9 Acres	22.5 Acres
	Total	4 Acres	24 Acres	60 Acres
Poteau (North of Poteau River)	Number of producing wells	0	3	7
	Well Pad Portion	0	1.5 Acres	3.5 Acres
	Access Road	0	6 Acres	14 Acres
	Flowlines	0	4.5 Acres	10.5 Acres
	Total	0	12 Acres	28 Acres
Tiak	Number of producing wells	0	2	4
	Well Pad Portion	0	1 Acres	2 Acres
	Access Road	0	4 Acres	8 Acres
	Flowlines	0	3 Acres	6 Acres
	Total	0	8 Acres	16 Acres
Total Area Disturbed Well Pad Portion		1.5 Acres	20.5 Acs	48.5 Acres
Total Area Disturbed Roads		6 Acres	82 Acres	194 Acres
Total Area Disturbed Flowlines (Pipelines)		4.5 Acres	61.5 Acs	145.5 Acs
Total Area Disturbed		12 Acres	164 Acres	388 Acres

The following summarizes the net cumulative disturbance of drilling and production operations (well pads + new roads + pipelines/flowlines for producing wells).

	Low	Medium	High
Total Area Disturbed (Acres) Drilling	84.5	391.5	1025.5

The following area will be reclaimed. This includes the entire well pad for the dry holes, all but ½-acre for the producing wells and 100 percent of the roads for the dry holes.

	13 Dry Wells	25 Dry Wells	35 Dry Wells
Total Area Reclaimed (Acres)	72.5	227.5	417.5

	3 Producers	41 Producers	97 Producers
Total Area After Reclamation* (Acres)	7.5	102.5	242.5

*After Reclamation of dry wells. Producing wells will be reclaimed when production ceases.

Total Wells Projected	16	66	132
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The following area will be added for flowlines (pipelines) on producing wells.

Total Area Flowlines (Acres)	4.5	61.5	145.5
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Flowlines (pipelines) are reclaimed as soon as the pipeline is placed into the pipeline trench.

The net long term cumulative impact is calculated by adding the total area left disturbed after reclamation to the area needed for flowlines/pipelines. These areas will be maintained for production for the life of the well and subject to total reclamation after production ceases. During the production stage, all disturbed areas not used for equipment or traffic will be stabilized with grass and subject to conservation maintenance practices, as directed by the Forest Service. This includes the flowline/pipeline rights-of-way, slopes on the edge of well pads, road cuts, etc.

Total Area (Acres) Net Long Term Disturbance	12	164	388
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Supplemental Minerals Program Procedures:

Projected Minerals Activity: Projected minerals activity in the planning period will be from coal bed methane exploration and possible development, possible natural gas exploration, existing hardrock minerals operations (quartz, novaculite, gravel and building stone), and with new proposed hardrock minerals operations. It is projected that there will be 7 to 16 gas wells drilled on the Forest, with 7 being commercially productive. The rest would be dry holes, and the sites would be reclaimed. For each of the producing well sites, the area needed for production would be less than was needed for the drilling phase. The size of the drill pad would decrease from two acres of disturbance to about $\frac{1}{4}$ acre, with the unneeded portion being reclaimed. In the next 10-year planning period, 5 new quartz operations are expected to occur. Most case sites are operated intermittently. The nature of hardrock mining operations on the Ouachita National Forest requires that they proceed at a slow and methodical pace. These are all surface operations.

New common variety mineral material operations are expected to occur at the rate of at least 40 to 60 per year. These are small tonnage short duration removals primarily from within the existing 22 pits and the primary building stone site on the Forest. Operations outside of existing pits are small tonnage (generally several pickup loads) hand removals of surface exposed building stone. Site-specific environmental analysis is conducted on all new sites. Gravel pits on the Forest are long-term impacts to allow controlled centralized access to essential pit-run aggregate resources. Pits are designed to prevent water runoff and consequent siltation from leaving the pit site and impacting adjacent Forest resources. All pits on the Ouachita National Forest are worked intermittently by Counties and Forest Service contractors removing material for public projects (roads, etc) as needed.

There are positive economic impacts resulting from oil and gas exploration and development activities. Lessees/operators usually contract locally for road and drill pad construction. They purchase food, fuel, lodging and other supplies from local sources and may subcontract certain parts of the operation to local well servicing companies. Most of the salaries paid to workers are spent in the local area. The estimated dollars that an average drill rig generates per day is over \$200 per worker. A typical well drilling operation will have an average of 10 to 20 workers. This translates into about \$2,000 to \$4,000/day spent in the local area. Since the average gas well in this area takes 2 to 4 weeks to complete, \$28,000 to \$112,000 per well goes into the economy. There are 59 hardrock mining cases for quartz crystal, novaculite, wavellite, aggregate (gravel) and building stone, and one energy case for coal bed methane. The accumulated total existing surface impacts from these operations located across the Forest is approximately 120 acres. Average surface impact is less than 2 acres per case. This represents less than $\frac{1}{10^{\text{th}}}$ of 1 percent of the total Forest land base.

Acquired Status: Acquired status refers to those Federal lands and minerals purchased, donated, or received in exchange for purchased or donated lands and minerals. The Weeks Act of March 1, 1911 (36 Stat.961, as amended) is the primary land acquisition authority for the Forest Service where Acquired status lands and minerals are involved. The USDI Bureau of Land Management is the lead Federal permitting agency for all energy and hardrock minerals permitting, leasing, and related operations on Federal Acquired status lands and minerals. They are referred to as "leaseable" minerals administered by the USDI Bureau of Land Management under Title 43 of the Code of Federal Regulations Part 3100 (Oil and Gas), Part 3400 (coal) and Part 3500 (hardrock). Where National Forest lands are involved, the Forest Service has consent authority and sets the stipulations and operating conditions (see "Oil and Gas Lease Stipulations," below). In addition, the Forest Service works with the Bureau of Land Management to monitor approved minerals operations for compliance. Acquired minerals operations generate Federal revenue that is managed by the USDI Minerals Management Service.

Public Domain: Public Domain Status lands are those Federal lands that were secured by the Federal Government through treaties and that have never left Federal ownership. Hardrock "locatable" minerals (i.e. precious metals and metallic minerals) under the authority of the 1872 Mining Law, are located as mining claim on Public Domain status lands that are open to mineral entry. Mining claim filings and adjudication are administered by the USDI Bureau of Land Management under Title 43 of the Code of Federal Regulations Parts 3800 through 3870. Field operations under the locatable minerals program is administered by the Forest Service under Title 36 of the Code of Federal Regulations Part 228 A. Mining claimants must provide operating plans or notices and reclamation plans to the Forest Service for approval to operate. An environmental analysis is conducted, and reclamation bond collected before operations can commence. The Forest Service monitors active operations for compliance. Energy minerals on Public Domain lands are managed by the USDI Bureau of Land Management in a manner similar to those on Acquired status lands.

Leasable Minerals – Energy, Typical Drilling Scenario: Historically, wells in Arkansas are drilled on a 640-acre spacing. The number of wells drilled is dependent on the oil and gas market values and the perceived impact of the lease stipulations by the oil and gas industry. In this geographic area, the standard approach is to drill vertical holes from a single drill pad down to the target formation. The deeper the suspected oil/gas bearing rock layer lies, the larger the drill rig must be and, consequently, the larger the drill pad must be to accommodate it. Since the known producing zones north of the Ouachita National Forest boundary, primarily in the Arkansas River Valley, lie relatively shallow with deeper plays to 6,000 feet, smaller drill rigs and pads are needed. Once the APD has been obtained from the BLM, the operator will construct an access road to the drill site and smooth out a pad to erect the derrick on. As stated in the RFD scenario, preparation for the drilling process includes construction of a drilling pad and reserve pit. Construction procedures must conform to the approved surface use plan of operations. Typically, one to two acres are cleared and graded level for construction of the well pad. However, depending on the topography of the well site and access area, this construction may require the creation of cut slopes and fill areas that may disturb additional area. The excavated reserve pit is usually about five feet deep and is lined with bentonite clay. Plastic or butyl liners (or its equivalent) that meet state standards for thickness and quality are used on occasions when soils are determined incapable of holding pit fluids. Constructed access roads normally have a running surface (width) of approximately 15 feet and a right-of-way of 30 feet; the length is dependent upon the well site location in relation to existing roads or highways. The average length of road construction will be about ½ of a mile or less (approximately 1 acre disturbance).

Because the cost of rig time in drilling a well is usually several thousand dollars a day, drilling is conducted 24 hours a day, 7 days per week when possible. Wells are usually drilled in 7 to 30 days depending on the depth of the hole, the number and degree of mechanical problems, or if a well is a dry hole or a producer. Wells are drilled by rotary drilling rig using mud as the circulating medium. Mud pumps would be used to force mud down the drill pipe, thereby forcing the rock cuttings out of the wellbore. Water used in the drilling process would normally be from a well drilled on the site; however, water could be pumped to the site from a local pond, stream, or lake through pipe laid on the surface. Water could also be hauled to the site by the use of tanker trucks. Shallower wells could be drilled with air instead of mud. Pad size and access would be the same. Approximately 500 barrels of drilling mud are kept on the location. Mud may also be needed for some down hole logging programs. Water production would be expected during the life of the field, separation, dehydration, and other production processing may be necessary. Construction of facilities off Federal lands may be needed to handle this processing. Some processing or temporary storage may be necessary on site, usually in the form of tanks.

Material used in construction of the pads and access road (i.e., rock, shale, or gravel fill) shall be obtained from pre-approved sources. Shale and/or gravel used in construction of the drilling pad shall be stockpiled when restoring the area. For all surface-disturbing activities, the topsoil to be removed will be stockpiled for redistribution over the disturbed area prior to fertilizing and reseeding of the site. Surface soil material stockpiles should be located to avoid mixing with other subsurface materials during construction and reclamation. Stockpile locations should be located so wind and water erosion are minimized and reclamation potential is maximized. In areas where excavation will be extensive or extreme, or where bedrock will be encountered, existing topsoil shall be replaced. Restoration of the area will include reseeding of the area with natural grasses as determined by the authorized Forest Officer. If drilling results in a producing well, the drilling pad must be reduced to a maximum area of 10,000 square feet (0.23 acres), and the remainder shall be restored to blend into the natural terrain. For a producing well, the operator will either install tanks on site to hold the oil and any produced water, or else a pipeline will be hooked up to the well head and the product transported off site. A producing gas well will have a pipeline connected to the wellhead or "Christmas tree," and the gas will then be pumped off through these gathering lines. Either way, the amount of space required for these facilities is considerably less than the original pad size and will be reclaimed around the unneeded edges.

Gas pipelines and/or oil flow lines will be constructed in conjunction with the construction of the access roads whenever possible to minimize additional disturbance. Pipeline right-of-way shall not exceed 30 feet in width. Exact right-of way widths may be set by ground conditions. Whenever possible, pipeline when buried must be at a depth of at least 48 inches. Any deviation from the 48-inch depth must be approved by the appropriate Forest Service officer prior to any surface disturbing activity taking place. When possible, a common point of collection shall be established to minimize the number of production sites. All pipeline designs, construction, operation, and maintenance shall comply with Federal Safety Standard for Gas Lines, Code of Federal Regulations, Part 192, Title 49, unless more stringent requirements are required by the State of Arkansas. If the well is a dry hole, or cannot produce commercial quantities of oil/gas, then it will be closed off by plugging and capping the top of the pipe in the hole. All equipment will be removed from the site, and the drill pad area will be re-sloped and seeded with a mixture of native plants. There will be a positive economic effect on the local economy in areas close to drill sites. The drilling operation will rely on local merchants for food, fuel, and supplies (see Cumulative Impacts), and often housing as well. Pad and road construction is often subcontracted to local companies or companies employing local expertise.

Private Mineral Rights - Reserved and Outstanding Mineral Rights: Reserved or Outstanding mineral rights are those minerals owned by parties other than the Federal government under Forest Service administered lands. Reserved minerals are those "reserved" to the party who transferred the lands to the Forest Service. Outstanding minerals are those that are "outstanding" to a third party. The authority for the administration of mineral reservations is 36 CFR 251.15 or previously issued Secretary of Agriculture's rules and regulations that govern the exercise of mineral rights reserved in conveyances to the United States. The appropriate rules and regulations in effect at the time of the mineral reservation were incorporated as part of the deed by which the United States acquired the surface. Forest Service direction for the administration of reserved and outstanding rights is found in Chapter 2830 of Forest Service Manual 2800.

Oil and Gas Lease Stipulations

Stipulations are applied by the Forest Service during the formal consent process to evaluate the National Forest System lands under lease consideration by the Bureau of Land Management. A uniform format for oil and gas lease stipulations was developed by the Rocky Mountain Regional Coordinating Committee (RMRCC) comprised of the USDI Bureau of Land Management (BLM), USDA Forest Service, and various representatives from the legal, industry, and environmental communities. The stipulations attached by the Forest Service are based on the management objectives established through the Forest Plan. Stipulations developed by the Committee and adopted by the BLM and Forest Service are as follows:

- No Surface Occupancy (NSO): Use or occupancy of the land surface for fluid mineral exploration or development is prohibited to protect identified resource values. The NSO stipulation includes stipulations which may have been worded as "No Surface Use/Occupancy," "No Surface Disturbance," "Conditional NSO" and "Surface Disturbance or Surface Occupancy Restriction (by location)."
- Controlled Surface Use (CSU): Use and occupancy is allowed (unless restricted by another stipulation), but identified resource values require special operational constraints that may modify the lease rights. CSU is used for operating guidance, not as a substitute for the NSO or Timing stipulations.
- Timing Limitation (Seasonal Restriction): Prohibits surface use during specified time periods to protect identified resource values. This stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need for such mitigation and that less stringent, project specific mitigation measures would be insufficient.
- Lease Notice: Provides more detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders. A Lease Notice also addresses special items that the lessee should consider when planning operations, but does not impose new or additional restrictions. Lease Notices attached to leases should not be confused with Notices to Lessees (re: 43 CFR 3160.0-5). Standard Lease Notices made part of all leases:
 - All or part of the leased lands may contain animal or plant species classified under the Endangered Species Act of 1973, as amended. Other species may have been identified as Sensitive in accordance with Forest Service Manual 2670 and be listed on the current Regional Forester's List of Sensitive Plant and Animal Species. Further information concerning the classification of these species may be obtained from the authorized Forest Officer. Exploration and development proposals may be limited or modifications required if activity is planned within the boundaries of a Proposed, Threatened, Endangered, or Sensitive plant or animal species location as it then exists. All activities within these areas must be conducted in accordance with existing laws, regulations, and Forest Plan guidelines.
 - All or part of the leased lands may be classified as wetlands in accordance with Executive Order 11990, "Protection of Wetlands" or a floodplain in accordance with Executive Order No. 11988, "Floodplain Management." Additional management requirements for the protection of riparian areas are contained in 36 CFR 219.27(e) and the National Forest Management Act of 1976. All activities within these areas may require special measures to mitigate adverse impacts to the resource values. They must comply with the above referenced executive orders, regulations, and laws and be in accordance with the Forest Plan guidelines. Further information concerning the classification and management of these lands may be obtained from the authorized Forest Officer.

Statutory and Regulatory Direction (Laws and Authorities) Affecting Minerals Activities on the Ouachita National Forest

The following section discusses the primary laws, regulations, and policies that regulate minerals activities on the Ouachita National Forest. Statutory and regulatory direction separates mineral resources in the publicly owned lands of the United States into three categories: locatable, leasable, and salable. Statutes, regulations, and Executive Orders guide Forest Service policy governing the exploration and development of mineral activities on National Forest System lands. Management direction for mineral resources on the Ouachita National Forest can be found in the following areas:

Public Law 100-446, Section 323, enacted September 27, 1988, directs the Forest Service to administer quartz minerals on the Ouachita National Forest in Arkansas as a "Salable" mineral by the Forest Service, under Title 36 of the Code of Federal Regulations, Part 228C. It further provides that one half of the revenues generated by the Forest Service are to be returned back to State of Arkansas specifically for use in county school and road programs.

The Federal Onshore Oil and Gas Leasing Reform Act of 1987 (PL 100-203) Provides additional authority for the Forest Service in regards to leasing and administration of surface operations during oil and gas development. The BLM may not issue any lease on National Forest public domain lands over the objection of the Secretary of Agriculture. Forest Service must approve and administer all surface disturbing activities on leases issued on National Forest System lands. The Act repealed the Known Geologic Structures (KGS) process and the Simultaneous leasing system (SIMO). The Act established a 2-level leasing process: 1) all tracts are offered competitively to the highest bidder, with a minimum bonus bid of not less than \$2/acre, in addition to the annual rental; and 2) tracts offered for competitive sale which receive no bids, and for which no pre-sale applications were received, are then available non-competitively ("over-the-counter") for 2 years after the sale. The competitive lease sale notices must be posted in the appropriate Forest Service office for 45 days prior to the competitive lease sale. Prior to approval of applications for permits to drill (APDs) or lease modifications, a notice must be posted for 30 days prior to approval.

The National Materials and Minerals Policy Research and Development Act of 1980 (94 Stat. 2305; 30 USC 1601-1605) states the current policy of the Federal government regarding oil and gas exploration and development. This Act states that private enterprise is to be encouraged to develop domestic mineral resources and that Federal agencies are to facilitate availability and development of domestic resources. It also emphasizes prompt reclamation of disturbed lands.

The Energy Security Act of 1980, Section 262 (42 USC 8855) directs the Secretary of Agriculture to process applications for leases and permits to explore, drill, and develop resources on National Forest System lands, notwithstanding the current status of the Land and Resource Management Plan ("Forest Plan").

Surface Mining Control and Reclamation Act of 1977 prohibits surface (strip) mining of coal on federally administered lands located east of the 100th Meridian.

The Federal Land Policy and Management Act of 1976 (43 USC 1714) states public lands and their resources will be periodically and systematically inventoried, and their present and future use projected through a land use planning process. It also requires that the "public lands be managed in a manner which recognizes the Nation's need for domestic sources of minerals, food, timber and fiber from public lands, including implementation of the Mining and Minerals Policy Act of 1970." Sec. 314 requires the filing of mining claims and annual assessment work

with the USDI Bureau of Land Management (The Supreme Court has rendered a decision upholding the constitutionality of this section).

Mining and Minerals Policy Act of December 31, 1970 establishes a National Minerals Policy, and states in part: "Congress declares that it is the continuing policy of the Federal Government in the national interest to foster and encourage private enterprise in (1) the development of economically sound and stable domestic mining, minerals, metal and mineral reclamation industries; and 2) the orderly and economic development of domestic mineral resources, reserves, and reclamation of metals and minerals to help assure satisfaction of industrial, security and environmental needs."

Wild and Scenic Rivers Act of October 2, 1968: Under the Act, the minerals in federal lands which are part of the system and constitute the bed or bank, or are situated within one-quarter mile of the bank of any river segment which is designated a wild river under this Act, are withdrawn from all forms of appropriation under the mining laws and from operation of the mineral leasing laws. This restriction does not apply to those segments of a Wild and Scenic River that are designated as "scenic" or "recreational."

Mineral Leasing Act Revision of 1960 established a system of leasing public lands through either a competitive bidding process, utilized when BLM determined the lands to be within a known geological structure (KGS), or by one of two non-competitive leasing processes – an "over-the-counter" application process for non-KGS lands that had never been leased before and a simultaneous lottery type system (SIMO) for non-KGS lands that had been previously leased.

Multiple-Use Sustained-Yield Act of 1960 established the multiple use principles on which the National Forest Management Act of 1976 is based. The Multiple-Use Sustained-Yield Act specifically addresses the role of minerals in the management of the National Forests. The Act states, "Nothing herein shall be construed so as to affect the use or administration of the mineral resources of national forest system lands ..."

Multiple Use Mining Act of 1955, Act of July 23, 1955 (Public Law 84-167) amended sections 1 and 2 of the Materials Act of 1947. This legislation defined "common varieties" of mineral materials, and distinguished them from rare varieties, that may be locatable in certain states under the Mining Laws of 1872.

Mineral Leasing Act for Acquired Lands Act of August 7, 1947 extends the provisions of the mineral leasing system to all acquired federal minerals, including those within the National Forests, unless excepted by the Act. It requires the consent of the Secretary of Agriculture prior to the BLM issuing a lease covering acquired lands administered by the Forest Service.

The Common Varieties of Mineral Materials Act of July 31, 1947 authorizes the disposal of mineral and vegetative materials through a sales system on public lands of the United States. The law also provides for free use of these materials by federal or state agencies, municipalities, or nonprofit associations, if not for commercial, industrial, or resale purposes. This Act authorizes the Secretaries of the Interior and Agriculture, under such rules and regulations as they may prescribe, to dispose of mineral materials, including but not limited to common varieties sand, stone, gravel, pumice, pumicite, or cinders.

The Mineral Lands Leasing Act of 1920 (40 Stat. 437; 30 USC 181-287) provides for leasing of energy minerals (coal, oil, gas, oil shale), sodium, phosphate, and potassium on all lands owned by the United States, except for those acquired under the Weeks Act of March 1, 1911. The USDI Bureau of Land Management (BLM) is the federal government's mineral leasing agency.

Mineral Resources on Weeks Law Lands Act of March 4, 1917 authorizes the Secretary of Agriculture to permit the prospecting, development, and utilization of mineral resources on lands acquired under the Weeks Act of 1911 (subject to section 402 of Reorganization Plan No. 3, of July 16, 1946 that transferred the function to the Secretary of Interior). The Functions Transfer Act of June 11, 1960 transferred the function back to the Secretary of Agriculture with respect to mineral materials only (sand and gravel).

The Organic Act of 1897 (16 USC 475), which provided for the administration of National Forests, and the Multiple Use-Sustained Yield Act of 1960 (16 USC 528), establishes the legal mandate that National Forests are to be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes. The Multiple Use-Sustained Yield Act further states that management of National Forest System lands shall not affect the use or administration of the mineral resources in these lands.

The General Mining Law of May 10, 1872 authorizes locations of mining claims on public domain lands, sets the conditions for the dimensions of the claims, and establishes the procedures for holding mining claims. It applies to all mineral deposits in National Forest System lands reserved from the public domain, or which were acquired by exchange under the Act of March 20, 1922, and National Grasslands, or other Title III lands transferred from the public domain, except for oil, gas, oil shale, coal, and other "leasing act" minerals, and mineral materials, including, but not limited to, sand and gravel. Mining laws do not apply to lands situated in Minnesota, Michigan, Wisconsin, Alabama, Missouri, and Kansas; and certain lands in Oklahoma. It generally declares that all valuable locatable mineral deposits and public domain lands where they are found are free and open to exploration, occupation, and purchase under regulations prescribed by law.

Regulations:

Title 36 of the Code of Federal Regulations, Part 228 - Minerals sets forth the rules and procedures through which use of the surface of National Forest System lands, in connection with mining and mineral operations, shall be conducted so as to minimize adverse environmental impacts on National Forest System surface resources.

Onshore Oil and Gas Order #1 (Appendix A of 36 CFR 228E) states the necessary requirements for the approval of all proposed exploratory, development, and service wells. The Order requires the lessee/operator to submit a Surface Use Plan of Operation and a Drilling Plan as part of the Application for Permit to Drill (APD). Both the Forest Service and the BLM must approve the APD prior to drilling operations commencing on NF lands. The Forest Service adopted the section of BLM's Onshore Oil and Gas Order #1 that dealt with Surface Use Plans of Operation, and incorporated it as Appendix A of 36 CFR 228E.

Title 36 of the Code of Federal Regulations, Part 251.15 – Reserved Mineral Rights sets forth the rules and procedures through which use of the surface of National Forest System lands, in connection with mining and mineral operations reserved in a deed, shall be conducted so as to minimize adverse environmental impacts on National Forest System surface resources.

Title 36 of the Code of Federal Regulations, part 219.22 (f) Specifically addresses minerals in Forest plans. The following shall be recognized to the extent practicable in forest planning: (f) the probable effect of renewable resource prescriptions and management direction on mineral resources and activities, including exploration and development. Lands Statutorily Withdrawn from Mineral Entry or Mineral Leasing:

- Subject to valid existing rights then existing effective January 1, 1984, the minerals in lands designated under the Wilderness Act of September 3, 1964, are withdrawn from all forms of appropriation under the mining laws and from disposition under all laws pertaining to mineral leasing.
- Subject to valid existing rights, the minerals in federal lands, which constitute the bed or bank, or are situated within ¼ mile of the bank of any river designated a "Wild River" under this Act, are withdrawn from all forms of appropriation under the mining laws and from operation of the mineral leasing laws. *Note:* This restriction does not apply to those segments of a Wild and Scenic River that are designated as "scenic" or "recreational." Elsewhere, the W&SR sections of the EIS and LMP should list the Wild & Scenic Rivers, their classification, the miles of river in each category, how many acres fall within ¼ mile of any wild segments, and the acreage within the various river category management area corridors. If the width of the management corridor for the wild segment of the river exceeds the ¼ mile area statutorily withdrawn, then a standard should be established for those acres outside the ¼ mile, but within the corridor (possibly leasing with no surface occupancy). For the corridor areas, which are managed as scenic or recreational, a controlled surface use stipulation could be adopted which precludes any long term surface disturbance which would alter the esthetics of the area which qualified it for inclusion in the W&SR system. By using this stipulation, short-term use, such as running a seismic line during the summer, could be authorized.

Policy:

Forest Service Manual (FSM) 2800 sets forth the policy and procedure the Forest Service will implement when working with the laws and regulations governing mining and minerals operations on the surface of National Forest lands.

Executive Order:

Executive Order 13212 (Actions to Expedite Energy-related Projects) of May 18, 2001 states that Executive departments and agencies shall take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy. For energy-related projects, agencies shall expedite their review of permits or take other actions as necessary to accelerate the completion of such projects, while maintaining safety, public health, and environment protections.

Other major acts affecting minerals activities:

The Clean Air Act (91 Stat. 685; 42 USC 7401 et. seq.) provides that each state is responsible for ensuring the achievement and maintenance of air quality standards within its borders.

The Federal Water Pollution Control Act, as amended by the Clean Water Act in 1977 (33 USC 1251 et. seq.) establishes national standards to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.

The Endangered Species Act of 1973 (Public Law 93-205; 16 USC 1531, et. seq.) as amended, requires special protection and management for Threatened and Endangered species on Federal lands. The U.S. Fish and Wildlife Service (USFWS), U.S. Department of the Interior, is responsible for the administration of this Act. Federal agencies proposing an action or processing an action by a third party which "may affect" the existence of identified species must consult with USFWS to determine if the proposed action will jeopardize the continued existence of those species.

The Wilderness Act of 1964 (78 Stat. 890; 16 USC 1131-1136) establishes a National Wilderness Preservation System (NWPS) made up of lands administered by the Forest Service (Department of Agriculture) and the Department of the Interior. Section 2 (a) of the Act states that wilderness areas "...shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness..."

The Wild and Scenic Rivers Act of October 2, 1968 (82 Stat. 906, as amended; 16 USC 1271-1287) declares it to be the "policy of the United States that certain selected rivers of the Nation...shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations." In August of 1979, President Jimmy Carter issued a directive requiring each Federal Agency to "...take care to avoid or mitigate adverse effects on rivers identified in the Nationwide Inventory of Potential Wild and Scenic Rivers."

Withdrawal Review – Ouachita National Forest Minerals Withdrawals

Determination to recommend maintaining or revoking an existing mineral withdrawal, or initiate action to approve a new mineral withdrawal is based on the need to protect the resource or administrative values of the lands in question (Section 204 of the Federal Land Policy and Management Act of 1976). Where it is determined that full protection from the provisions of the 1872 mining law is necessary and that existing regulatory controls applied to a mining related activity would not be sufficient to secure this protection, then it is appropriate to recommend removing the lands from mineral entry. Where it is determined that existing regulatory controls would be sufficient then the lands should be made available for entry under the mining laws.

In order to protect valuable surface resources for special sites and areas like administration and recreation sites, some Public Domain status lands are withdrawn from locatable mineral entry for administrative purposes. A review of mineral withdrawals was conducted to determine if withdrawals on the Ouachita National Forest should remain in effect or recommended for removal. The USDI Bureau of Land Management is the lead Federal agency for monitoring and managing administrative mineral withdrawals. The withdrawals do not affect leasable energy and common variety disposals unless so stated in the withdrawal authority. Status of lands for mineral entry is discussed below.

1. LAKE OUACHITA

Public Land Order 628 (PLO 628) dated 2/13/50 withdrew 26,146.32 acres of public domain lands for use by the Department of the Army for flood control purposes. In 1987, lands around Lake Ouachita were formally interchanged between the Corps and the Forest Service. The lands around Lake Ouachita are chiefly valuable to maintain high water quality standard and recreation for the lake. The 16,795.74 acres of land around Lake Ouachita currently withdrawn from mineral entry are recommended to remain so withdrawn. An additional 2,000 acres of public domain lands within the Lake Ouachita Management Area, chiefly valuable for similar purposes, are recommended to be withdrawn from mineral entry and are identified as such:

T1N R22: Sec. 35 - 80 acres; T2S R21: Sec. 19 - 160 acres; T2S R22: Sec. 23 - 520 acres; Sec. 24 - 160 acres; Sec. 30 - 120 acres; Sec. 31 - 80 acres; Sec. 32 - 240 acres; Sec. 33 - 120 acres; T2S R23: Sec. 04 - 40 acres; Sec. 23 - 280 acres; Sec. 25 - 40 acs; Sec. 26 - 160 acs.

2. POTEAU MOUNTAIN

Because of its proximity to the Poteau Mountain Wilderness and Congress' stated intent to confer a special protective status to these lands, it is recommended that the following public domain lands within the Poteau Management Area be withdrawn from mineral entry: 3,400 acres:

T4N R30: Sections 19, 20, 21(SWSW), 28(SWNW, S2SW), 29, 30, partials 31&32
T4N R31: partial Sections 25, 36

3. LAKE WINONA

Lake Winona furnishes approximately 46 percent of the water needs for the 300,000 people in the city of Little Rock, the state capital of Arkansas. The Forest Service and the city of Little Rock have a cooperative agreement to establish a public use area and various management practices that will be followed to protect this valuable water source. Certain types of mining practices may be incompatible with the need to maintain high quality standards for the Lake Winona watershed. A withdrawal is necessary to prevent mining related activities that could adversely impact the watershed and affect the water quality of Lake Winona, and to prevent the potential loss of government control of surface resources that could result from a transfer of lands to the private sector as a result of key provisions of the general mining law. The following public domain lands around Lake Winona are recommended to be withdrawn from mineral entry: 1,120 acres:

T2N R17W: partial Sections 19 (SW, E2E2), 20 (W2W2), 30 (NW)
T2N R18W: partial Sections 15 (SW), 22(NW and S2), 23 (S, NE), 24 (S2), 25 (N2N2)

4. LOOKOUTS AND OTHER SITES

Twenty-four sites have been withdrawn from mineral entry as lookouts, guard stations, warden stations and warehouses, under authority of PLO 13358/27/56. The following 11 sites are no longer in use for specific administrative purposes. It is recommended that the withdrawals on these sites be lifted: 230 acres:

- Paul Mountain Lookout, Vanderslice Lookout, Allen Peak Lookout, Shady Warehouse, Muddy Mountain Lookout, Bear Knob Lookout, Eagle Gap Guard Station, Slatington Lookout, Cold Springs Guard Station, Pigeon Creek Warden Station, North Fork Pinnacle Lookout

The following 13 sites are still in use for specific administrative purposes. It is recommended that the withdrawals remain in effect on these sites: 220 acres:

- These nine sites originally were used as lookouts but are now needed for electronic sites: White Oak, Eagle Mountain, High Peak, Dutch Creek, Poteau Mountain, Tall Peak, Bee Mountain, Ouachita Pinnacle, Wolf Pinnacle
- These four sites remain in use for their original purpose: Jessieville Guard Station, Oden Ranger Station, Fiddlers Creek Game Warden Station, Hickory Nut Lookout

In addition, the following site is now in use as an electronic site. It is recommended that the site be withdrawn from mineral entry: 10 acres:

- Kingdoodle Knob Electronic Site (Union Hill Site) T4N, R27W Section 36

5. RECREATION AREAS

The following recreation areas have been withdrawn by the public land orders (PLO) as noted, and are currently being used for the purpose of the withdrawal. It is recommended that the withdrawals for these lands remain in effect: 566.60 acres:

- South Fourche (PLO725, 6/4/51); Crystal Campground (PLO725, 6/4/51); Shady Lake (PLO725, 6/4/51); Jack Creek (PLO 1335, 8/27/56 and PLO 1447, 7/18/57); Knoppers Ford (PLO 1335, 8/27/56 and PLO 2439, 7/18/61); Iron Springs (PLO 1335, 8/27/56); Charlton (PLO 1335, 8/27/56); Bard Springs (PLO 1335, 8/27/56 and PLO 1447, 7/18/57); Collier Springs (PLO 1335, 8/27/56); Queen Wilhelmina State Park (PLO 2597, 1/29/62)
- The Mine Creek site was withdrawn from mineral entry under authority of PLO 1560 on 12/6/57 and is no longer needed. It is recommended that the withdrawal for Mine Creek be removed: 504.22 acres

6. SCENIC AREAS

The following scenic areas have been withdrawn by the public land orders (PLO) as noted, and are currently being used for the purpose of the withdrawal. It is recommended that the withdrawals for these lands remain in effect: 1,926 acres:

Ouachita Lake Visitor Center (PLO 5053; 5/07/71) 920.0 acres, Womble RD, T2S R23W Sec 23-26

Dutch Creek Mtn Scenic Area (PLO 2436; 7/18/61) 320.5 acres, Fourche RD, T3N R26W Sec 1&2

Choctaw Trail (Skyline Drive) (PLO 4103; 9/29/66) 685.4 acres, Mena RD, T1S R30 thru 32W

The following scenic areas are to be managed in a manner to protect the scenic characteristics of the areas. This may be incompatible with minerals related activities. Further review of these areas is necessary to consider a recommendation of withdrawing them from mineral entry: 4,195 acres:

Blowout Mountain -- Oden RD; T1 S R26W Sec. 4, 5 (526 acres)

Dutch Creek -- Cold Springs & Fourche RD's; T3N R25&26W (624 acres)

Crystal Mountain -- Caddo & Womble RD's; T3S R24W Sec. 8 (100 acres)

Irons Fork -- Jessieville RD; T1 N R23W Sec. 5-9 (1,450 acres)

South Fourche -- Winona RD; T3N R19W Sec. 19, 20, 30 (1,495 acres)

7. RESEARCH NATURAL AREAS

Two research natural areas are identified on the Forest. The Roaring Branch Research Natural Area was withdrawn from mineral entry by PLO 5114 on 9/10/71. The Lake Winona Research Natural Area was designated as an RNA by the Chief on 11/7/77; however, the lands were not withdrawn from mineral entry. In addition, the Gap Creek watershed is proposed as an additional Research Natural Area in the Forest Plan. The need to protect the RNAs as unique research sites that will not be directly affected by man-caused impacts has led to the following recommendations:

Retain withdrawal - Roaring Branch RNA: Caddo RD, T4S, R28W- 330 acres

Withdraw Lake Winona RNA: Winona RD, T2N, R18W - 280 acres

Withdraw if Gap Creek RNA becomes established: Caddo RD T4S, R24W - 65 acres

8. EXPERIMENTAL FORESTS

The Alum Creek Experimental Forest was established by PLO 3647 on 4/15/65, and is currently being used for the purposes for which it was withdrawn. It is recommended that the withdrawal for Alum Creek be retained. 4,590 acres:

Alum Creek Experimental Forest (Winona RD): T1 N, R19W: partial Sections 4 and 5;
T2N, R19W: partial Sections 21-23,26-30,32-35

Note: the Irons Fork Experimental Forest (Mena RD, T1S R28W - PLO 1055, 1/18/55) is no longer in use. If it is still withdrawn from mineral entry, it is recommended that the withdrawal be removed.

Appendix G - Roadless Area/Wilderness Evaluations and Wild and Scenic Rivers

In accordance with 36 CFR 219.17, a new inventory of roadless areas was completed for this plan revision, and areas of the Ouachita National Forest that met the criteria for inclusion in the roadless area inventory (Chapter 7 of Forest Service Handbook 1909.12) were further evaluated for recommendation as potential wilderness areas. The reinventory of roadless areas included previously recognized roadless areas considered during development of the 1986 Forest Plan and the 1990 Amended Forest Plan. These areas were: Beech Creek, Rich Mountain, Blue Mountain, Brush Heap, Bear Mountain, and Little Blakely. Also, two areas near Broken Bow Lake in Southeastern Oklahoma, Bee Mountain and Ashford Peak, were identified in the January 2002 FEIS for Acquired Lands in Southeastern Oklahoma. Possible additions to existing wilderness areas were also considered.

The roadless inventory for the Ouachita National Forest was updated for this iteration of plan revision using Geographic Information System (GIS) technology. Evaluation of the Forest for areas meeting the criterion of one-half mile of improved [National Forest System] road or less per 1,000 acres yielded a significant number of candidate polygons and all polygons over 1,000 acres in size were considered to determine if there were any possibility of expanding the area to a suitable size to warrant consideration as possible wilderness. Polygons meeting the initial criteria were further analyzed using criteria found in FSH 1909.12 (Chapter 7.11) to produce the inventoried roadless areas described in this appendix. The planning team determined that, of the former RARE II areas, the only ones that meet the criteria for inclusion in the roadless area inventory are portions of Blue Mountain and Brush Heap. The roadless analysis for this Revised Forest Plan resulted in one new area that met the inventoried roadless criteria, Irons Fork Mountain. In addition, four potential wilderness additions were identified for the Flatside, Upper Kiamichi, Poteau Mountain, and Black Fork Mountain areas. Additional information about each of these areas is provided here and in the body of the FEIS. The complete Ouachita National Forest Roadless/Wilderness analysis is described in the process record, which is available for review at the Supervisor's Office. The following tabulation shows the nine inventoried roadless areas totaling approximately 45,160 acres that were identified and evaluated for wilderness potential during Plan revision:

Name	Approx. Acres
Blue Mountain	11,678
Brush Heap	8,353
Irons Fork Mountain	8,303
Bee Mountain	7,327
Ashford Peak	7,300
Flatside Addition	620
Upper Kiamichi Addition	1,096
Poteau Mountain Addition	77
Black Fork Mountain Addition	406
Total	45,160

This appendix contains evaluations of the inventoried roadless areas located within the Ouachita National Forest and four smaller areas located adjacent to existing wilderness areas. The following section presents the wilderness potential of the inventoried roadless areas in three categories:

- Capability – Qualities that make a roadless area suitable for wilderness.
- Availability – Features and resources that are not compatible with wilderness and the demand for the area.
- Need – A review and analysis of the amount of wilderness extant in the area, region, and nation.

FLATSIDE WILDERNESS ADDITION

ID No. 09001

Overview

Size

National Forest System Lands	620 Acres
Private	0 Acres
Total	620 Acres
Total Improved Road	0 Miles
Total Maintained Trail	0 Miles

Location and Access

Flatside Addition is located on the Winona Ranger District adjacent to the western end of Flatside Wilderness (Nimrod Southeast U.S. Geological Survey (USGS) 7.5 minute quadrangle map). The area is bounded by Flatside Wilderness to the east, National Forest System Road (NFSR) 124 to the south and west and the section line between Sections 5 and 32 to the north. The area is accessed by NFSR 132, also known as the Winona Auto Tour route, and NFSR 86 and 124.

Geography, Topography, and Vegetation

The Flatside Addition physical features are typical of the Ouachita Mountain region containing ridge and valley landscapes oriented on an east-west axis with distinct north-side and south-side vegetation communities. It is a part of the Fourche Mountain Subsection (M231Aa), Ouachita Mountains Section, of the Ouachita Mixed Forest – Meadow Province. The mesic (moist) north slopes and drainages are vegetated by hardwood and hardwood-pine forests. Xeric (drier) south slopes are vegetated by mid-successional, native short-leaf pine and, on areas recently acquired in the northern portion of the parcel, non-native loblolly pine.

Drainages are intermittent or ephemeral containing no fishable sections. Wildlife species are typical for the area and include both game and non-game species.

Current Use and Attractions

The area is used primarily for dispersed recreation such as hiking and hunting. Under the 1990 Amended Forest Plan, Off-Highway Vehicles (OHVs) could travel cross-country. The Preferred Alternative and Alternatives C and D would treat such motorized use as unsuitable.

There are significant rock outcrops in the area located along intermittent streams, and waterfalls and cascades are common during moist weather and after rain showers. The close proximity of NFSR 124 to the area allows easy access to these features, and they are frequently visited by the public.

Appearance of the Area and Characteristics of Surrounding Contiguous Areas

The area is natural appearing with little evidence of human use or manipulation, because the area is bounded on the east by the Flatside Wilderness. To the south and west, the area is bounded by a NFSR and general forest area which is influenced by the Winona Auto Tour, a popular scenic auto route within the Forest.

Capability

Natural Integrity and Appearance

Natural processes are operating within the area but are influenced by outside forces. The majority of the area is naturally appearing with little sign of human use. Vehicles using NFSR 124 may be seen and heard while within the addition area. The addition would buffer the existing Flatside Wilderness from similar impacts and assist in providing a more primitive recreation experience within the Wilderness.

Opportunity for Solitude, Challenge, and Primitive Recreation

Opportunities for solitude, challenge, and primitive recreation would not be significant within the 620-acre Addition. A net positive effect for visitors using Flatside Wilderness would be gained, because the Addition would buffer, the existing Wilderness and increase the visibility of the revised wilderness boundary. In addition, a simplified and more visible wilderness boundary at this location would aid in administrative management of the Wilderness. Desirable landform and geologic visual features located in the Addition would be protected under wilderness management and maintained for the public's continued use and enjoyment.

Special Features (Ecological, Geological, Scientific, Educational, Scenic, Historical, and Rare and Endangered Plants and Animals)

The Flatside Addition is located in the Fourche Mountains Subsection of the Ouachita Mixed Forest – Meadow Province. This 620-acre area, combined with the adjacent Flatside Wilderness, Black Fork Mountain Wilderness, Upper Kiamichi Wilderness, and Caney Creek Wilderness, would comprise nearly 1 percent (0.84 percent) of the Ouachita Mixed Forest – Meadow Province. The proposed Flatside Addition would encompass portions of the prominent and geographic feature called Flatside Pinnacle, as rugged formation popular for climbers and hikers.

Size, Shape and Manageability

The Flatside Addition would add acres to the western end of the existing Flatside Wilderness area. The use of NFSR 124 as the western boundary for the total wilderness would aid in the manageability of the wilderness by rendering the boundary more visible for both the public and Forest Service employees.

Boundary Conditions, Needs, and Management Requirements

Flatside Addition is bounded to the east by Flatside Wilderness and to the south and west by NFSR 124. The north boundary is the section line between sections five and thirty-two. The north boundary does not follow a readily visible and identifiable route but was necessary so that a portion of a previously planted non-native loblolly pine plantation would not be included in the recommended Addition.

Availability

Recreation and Tourism

The addition of these 620-acres to the Flatside Wilderness would not be expected to appreciably impact recreation opportunities or tourism in the area.

Wildlife

There are no occurrence records of Federally Proposed, Endangered, or Threatened (PET) species, nor records of Forest Service Sensitive species within the Addition. There are no designations of essential or critical habitat within or adjacent to this parcel. The Ozark Chinquapin, a Regional Forester's Sensitive Species, is known to occur within the Wilderness directly adjacent to the Flatside Addition.

Water Availability and Use

Streams in the Flatside Addition are intermittent or ephemeral and do not flow year-round. There are no known aquatic resources that would be impacted by wilderness designation.

Livestock, Timber, Minerals, and Land Uses

There are no livestock grazing allotments inside the Addition or adjacent to the Addition.

The Flatside Addition has high minerals potential for hard rock minerals. Should the Flatside Addition be designated as wilderness, the designation would eliminate the possibility of minerals exploration and development from the designated lands as both the land surface and subsurface (mineral rights) in the area are federally owned. There are no rights-of-way, easements or other encumbrances on the land.

The area is not frequently entered for silvicultural treatments, and the small size of the proposed addition would represent an almost imperceptible reduction in overall forest timber resources. Under the 1990 Amended Plan, the area is located in Management Area 14, General Forest Area.

Management Considerations (Fire, Insects/Disease and Non-Federal Lands)

As a part of a larger fire sub-climax ecosystem, the Flatside Addition has been managed using prescribed fire as a management tool. Should a wilderness designation be granted for the Addition, use of prescribed fire and associated beneficial uses could be lost or significantly curtailed. Wilderness designation would also preclude the creation of wildlife food plots and ponds and would severely limit or eliminate maintenance of existing plots and ponds.

Existing fire control techniques could be altered if the area is designated as wilderness. Mechanical ground suppression methods would no longer be available to fight wildfire without specific prior approval. Wilderness designation would make insect and disease treatment more difficult and could increase the chances that outbreaks could increase beyond desirable limits before being controlled.

Need

See Wilderness Need – Roadless Area Evaluations at the end of this Appendix.

BRUSH HEAP

ID No. 09002

Overview

Size

National Forest System Lands	8,353 Acres
Private	0 Acres
Total	8,353 Acres
Total Improved Road	0 Miles
Total Maintained Trail	21.3 Miles

Location and Access

Brush Heap is located on the Caddo Ranger District east of Polk County Road 64 and Shady Lake Recreation Area and north of and abutting the south proclamation boundary of the Forest. The area is found on the Athens, Big Fork, Nichols Mountain, and Umpire U.S. Geological Survey (USGS) 7.5 minute quadrangle map and is bounded by Polk County Road 64 and Caney Creek Wilderness to the west, NFSR 502 and Viles Branch to the south and the Little Missouri Wild and Scenic River to the east and NFSR 106 to the north. The area is accessed by all-weather NFSR 106 and 502 and Polk County Road 64.

Geography, Topography, and Vegetation

This area takes its name from Brush Heap Mountain. Also enclosed within the Brush Heap boundary are Blaylock, Fodderstack, and Raspberry Mountains. This steep east-west oriented mountain and valley terrain is vegetated with mesic hardwood forests on the north slopes and dry-xeric Pine Oak Forests on the south slopes. Large novaculite glades, woodlands, and talus areas are located along the ridge tops. Seven pine plantations totaling 442 acres with age classes from 7 to 35 years exist within the area. Also, several southern pine beetle outbreaks have occurred in the recent past – the largest occurring on 122 acres.

Drainages are perennial, intermittent, or ephemeral and include the major streams of Viles Branch, containing no fishable sections. Wildlife species are typical for the area and include both game and non-game species.

Current Use and Attractions

The area is used primarily for dispersed recreation such as hiking, nature study, fishing, and hunting. Under the 1990 Amended Forest Plan OHVs, due to the Little Missouri Watershed closure order, may not use this area for cross-country motorized recreation.

Brush Heap contains the following trails:

- The Athens-Big Fork Trail, a hiking-only trail, traverses 10.1 miles from south to north across the midsection of the Brush Heap area. The trail begins at the southern trailhead off NFSR B23F and terminates at the northern trailhead at the end of NFSR B15.
- The Viles Branch Equestrian Trail crosses the Brush Heap area from west to east, for a distance of 26 miles. The trail is open to horses and hiking but is closed to motorized vehicles. Travel time for the entire length of the trail is 6–10 hours by horse and two days by hiking. The Viles Branch Trail is accessed from the east trailhead located on NFSR 2106 or the west trailhead located ¼ mile from the intersection of NFSR 38 and 502.
- The Eagle Rock Loop Trail is a 26.8-mile loop trail located on the eastern end of the Brush Heap area with approximately 15 miles of the trail paralleling the Little Missouri Wild and Scenic River. The Eagle Rock Trail is open to hiking and bicycles, but closed to motorized vehicles. Five trailheads provide access to the Eagle Rock Loop Trail, located at Albert Pike Recreation Area; Winding Stairs point of interest area; Little Missouri Falls; Upper Little Missouri Falls; and Middle Athens–Big Fork.

The Brush heap Area includes NFSR 908 (2.4 miles), B19B (0.5 miles) and B02 (0.7 miles). All of these roads would be closed and either obliterated or allowed to return to a natural appearance should the area be designated as wilderness.

Bard Springs Recreation Area is located on the extreme western edge of the Brush Heap area adjacent to Polk County Road 64. The Recreation Area is moderately developed with campsites with flush toilets but no other major developments. Bard Springs would be utilized as a staging area for wilderness visitors but not included in the formal wilderness area.

Fourteen active wildlife food plots totaling 10 acres currently exist within the Brush Heap area and an additional four plots are planned, which would add four acres to the total. The area is a part of the Caney Creek Wildlife Management Area managed cooperatively with the Arkansas Game and Fish Commission with a focus on game animals.

Appearance of the Area and Characteristics of Surrounding Contiguous Areas

In 2002, a wildfire burned 1,250 acres in the Blaylock Mountain vicinity with effects that are still visible (September 2005). General management in the area of Brush Heap includes a 3–5 year prescribed fire rotation for fuels management and regeneration. From the Athens-Big Fork Trail to the eastern boundary, the majority of the area has been burned either by prescribed fire or by wildfire. With the exception of occasional small wildfires and prescribed fires, the western portion of the area has not been treated by fire to protect the Roaring Branch Research Natural Area. Only natural fires, managed under prescribed conditions are allowed in Roaring Branch.

Capability

Natural Integrity and Appearance

Natural processes are operating within the area but are influenced by outside forces, with two major influences being prescribed fire and recreation uses. The remaining area of Brush Heap is naturally appearing with little sign of human use. Vehicles

using adjacent routes may be heard by visitors within the periphery of the area, but the rugged interior masks all but the most pervasive noises. The area has high recuperative capability and, if left unmanaged, would return to a natural appearance within a short period of time.

Opportunity For Solitude, Challenge and Primitive Recreation

Opportunities for solitude, challenge and primitive recreation would be significant within the 8,353-acre area, especially within the interior valleys and drainages shielded from sights and sounds of adjacent non-wilderness areas. If designated as wilderness, the area could assist in enhancing existing wilderness experiences in Caney Creek Wilderness and in meeting recreational expectations along the Little Missouri Wild and Scenic River corridor as a result of the management practices required for all wilderness areas.

Special Features (Ecological, Geological, Scientific, Educational, Scenic, Historical, and Rare and Endangered Plants and Animals)

The Brush Heap area is home to the Cossatot leafcup (*Polymnia cossatotensis*), one of the rarest plant species in the area. The Cossatot leafcup has been found in only four documented sites, all of which are on the Ouachita National Forest. The Cossatot leafcup has been rated as a G-1 species globally and an S-1 species in Arkansas.

Also found in the Brush Heap area (Roaring Branch Natural Area) is the endemic Caddo Mountain salamander (*Plethodon caddoensis*). The Caddo Mountain Salamander is listed on the Regional Forester's Sensitive Species list and is the only animal PETS species found in the area.

Under Alternative D, should Brush Heap be designated a wilderness, as recommended, it would raise to one percent the portion of the Ouachita Mixed Forest – Meadow Province that is in designated wilderness.

Size, Shape and Manageability

The Brush Heap area is compact in shape and provides adequate area for consideration as wilderness. Polk County Road 64 and Caney Creek Wilderness to the west, NFSR 502 and Viles Branch to the south and the Little Missouri Wild and Scenic River to the east and NFSR 106 to the north would aid in the manageability of the Wilderness by rendering the boundary more visible for both the public and Forest Service employees. The area boundaries are easily identifiable both in the field and on existing maps, and existing management responsibility rests in only one ranger district.

Availability

Recreation and Tourism

The Brush Heap area is located in the general vicinity of several of the Forest's highest use recreation areas including Albert Pike and Shady Lake. In addition, the area is a popular destination for vacationers and weekend visitors from the surrounding area and from the more distant metropolitan areas of Dallas/Ft. Worth, Texas, and Shreveport, Louisiana. Private facilities and services catering to forest visitors are plentiful and easily obtained within the general area. Existing uses of the Brush Heap area (hiking, camping, horseback riding, etc.) would not be impacted if

the area were designated as wilderness, and there could potentially be an increase in visitor use of the area as a result of the designation and ensuing publicity.

Wildlife

There are no occurrence records of Federally Proposed, Endangered, or Threatened (PET) species in this area, and there are no designations of essential or critical habitat within or adjacent to this parcel. However, several species included on the Regional Forester's Sensitive Species list do occur here. Leader Mountain Walk-In Turkey Area is located immediately to the north of the Brush Heap area and is managed for a more primitive hunting experience.

Water Availability and Use

Streams in the Brush Heap area are a mix of intermittent, ephemeral and perennial. The larger streams—Viles Branch, Blaylock Creek, and East Fork Saline Creek—are essentially perennial streams. Blaylock Creek contains a year-round fishery. There are abundant seeps and springs within the confines of this area. There are no known aquatic resources that would be impacted by wilderness designation.

Livestock, Timber, and Minerals

There are no grazing allotments inside or adjacent to the Brush Heap area. An area of approximately 130 acres located adjacent to the Little Missouri Wild and Scenic River in Section 31 and 32, T4S, R28W have reserved subsurface mineral rights. However, these reserved rights have not been exercised, and no evidence of mining exists.

Management Considerations (Fire, insects/Disease and Non-Federal Lands)

Wilderness designation for this area would preclude the creation of wildlife food plots and ponds and would severely limit or eliminate maintenance of existing plots and ponds.

Existing fire control techniques could be altered if the area is designated as wilderness. Mechanical ground suppression methods would no longer be available to fight wildfire without specific prior approval. Wilderness designation for this area would make insect and disease treatment more difficult, and could increase the chances that outbreaks could increase beyond desirable limits before being controlled.

Need

See Wilderness Need – Roadless Area Evaluations at the end of this Appendix.

IRONS FORK MOUNTAIN

ID No. 09003

Overview

Size

National Forest System Lands	8,300 Acres
Private	3.00 Acres
Total	8,303 Acres
Total Improved Road	3.68 Miles
Total Maintained Trail	0 Miles

Location and Access

Irons Fork Mountain area is located on the Oden District approximately fourteen miles east of Mena, Arkansas. The southern part of the area can be accessed via Arkansas State Highway 88 to Ink and Polk County Road 87 to Pine Grove and Polk County Road 191 to NFSR 799. From the north, the area can be accessed via US Highway 270/71 to Polk County Road 70.

Geography, Topography, and Vegetation

The Irons Fork Mountain area is a part of the Fourche Mountain Subsection (M231Aa), Ouachita Mountains Section, of the Ouachita Mixed Forest – Meadow Province. Physical features are typical of the Ouachita Mountain region containing ridge and valley landscapes oriented on an east-west axis with distinct north-side and south-side vegetation communities. The mesic (moist) north slopes and drainages are vegetated by hardwood and hardwood-pine forests. Xeric (drier) south slopes are vegetated by mid-successional, native short-leaf pine and pine-oak forest types. Most drainages are intermittent or ephemeral containing no fishable sections. Irons Fork Creek meanders in and out of the northern portion of the area and may provide some seasonal fishing opportunities during periods of wetter weather.

Wildlife species are typical for the area and include both game and non-game species.

Current Use and Attractions

The area is used primarily for dispersed recreation such as hiking and hunting. Under the 1990 Amended Forest Plan, OHVs could use this area for motorized recreation, including off-trail and off-road use of the forest floor. The Preferred Alternative and Alternatives B through D would treat cross-country motorized travel as unsuitable Forest-wide and would include an objective to “designate and sign a system of roads and trails suitable for public access by motor vehicle, including, where appropriate off-highway vehicles, no later than October 2009.” Under Alternative D, motorized travel in the Irons Fork Mountain area would be unsuitable due to its eligibility for wilderness recommendation.

Appearance Of The Area And Characteristics Of Surrounding Contiguous Areas
Areas of Irons Fork Mountain have been harvested in the past and some evidence of this activity remains visible today. Most timber harvest and timber management activities were confined to small areas, around 20 acres in size; however, some activities impacted areas up to 60–70 acres in size. Some pine plantations have been introduced to the area and remain apparent. The recovery capability of the area is moderate to high, and signs of past management activities would be reduced over time as native vegetation matures in the affected areas and as screening vegetation limits views into some of the effected areas.

The area is almost completely bounded by NFSRs. NFSR 799 and 216 make up much of the southern boundary and NFSR 743 and County/Forest Service Road 76 makes up a large portion of the northern boundary. Five NFSR sections or roads are included in the area: Turner Fork Spur (450A – 0.5 miles), Turner Fork (450 – 1.2 miles), Standingwater Road (M53A – 1.2 miles), a portion of Nesbitt Creek Road (498 – 0.48 miles), and a portion of Robinson Creek Road (799 – 0.3 miles). These roads are all Maintenance Level 2 roads with the exception of Standingwater Road, which is a Maintenance Level 1 road.

There are no Forest Service developed recreation areas or other federally managed public facilities within the area.

Capability

Natural Integrity and Appearance

Natural processes are operating within the area but are influenced by outside forces. The majority of the Irons Fork Mountain area is naturally appearing with some indications of human use, mostly as a result of timber management activities. The area contains approximately four miles of NFSR inside the proposed boundary that add to the development related impacts; however, these roads generally terminate a short distance inside the boundary, and no roads penetrate the core area of Irons Fork Mountain. The general area has a moderate to good regeneration capability that would assist in the recovery of impacted areas in a reduced time period.

Opportunity For Solitude, Challenge, and Primitive Recreation

Opportunities for solitude, challenge, and primitive recreation are considered to be significant, especially within the interior valleys and drainages where the sights and sounds of adjacent human activity would be reduced or eliminated. At higher elevations on Irons Fork Mountain (some exceeding 2,100 feet in elevation), lights and development in the distance may be visible, but should not significantly reduce the overall wilderness experience of most visitors.

Special Features

There are no special features noted in the area.

Size, Shape and Manageability

The shape, size, and geography of Irons Fork Mountain are suitable for management as a unique unit. It is under the management of one Ranger District and located within one county reducing coordination and administrative requirements to the minimum. The area has good access and is not hampered by interior private land ownership issues or other legal constraints that could interfere with a wilderness experience by potential visitors.

Boundary Conditions, Needs And Management Requirements

As stated above, a large portion of the Irons Fork Mountain area is bounded by developed roadways. Other boundaries were selected to be as visible and locatable in the field as possible and use ridgelines and drainages, where possible. In a few cases, section lines were used as the only available demarcation lines identifying National Forest System lands from private; however, all due emphasis was given to reduce the reliance upon political or other boundary markers not readily visible to the public and Agency personnel.

Availability

Recreation And Tourism

Recreational activities are generally confined to hunting, hiking, and some OHV riding in the area. There are no developed trails or other recreational facilities. OHV activity would be eliminated, with the exception of emergency uses, should the area be designated as wilderness.

Wildlife

There are no occurrence records of Federally Proposed, Endangered, or Threatened (PET) species, nor records for Forest Service Sensitive species in the area. There are no designations of essential or critical habitat within or adjacent to this parcel. The valley floor of Irons Fork Creek, at times the north boundary of the Irons Fork area, is home to an endemic burrowing crayfish, *Procambarus reimeri*; however, this species is not found at the elevations characterizing the Blue Mountain area.

Water Availability and Use

With the exception of Irons Fork Creek, most streams inside the Irons Fork Mountain area are intermittent or ephemeral and do not flow year-round. There are no known aquatic resources that would be impacted by wilderness designation. Water for visitor use is generally not available in this location.

Livestock, Timber, and Minerals

There are no livestock grazing allotments within or adjacent to Irons Fork. One small area of approximately 40 acres located in Section 24, T29W, T1S, has reserved mineral rights. However, no surface evidence of mineral activity exists at this location.

Management Considerations (Fire, Insects/Disease and Non-Federal Lands)

Existing fire control techniques could be altered if the area is designated as wilderness. Mechanical ground suppression methods would no longer be available to fight wildfire without specific prior approval. Wilderness designation for this area would make insect and disease treatment more difficult and could increase the chances that outbreaks could increase beyond desirable limits before being controlled.

Need

See Wilderness Need – Roadless Area Evaluations at the end of this Appendix.

BLUE MOUNTAIN

ID No. 09004

Overview

Size

National Forest System Lands	11,678 Acres
Private	0 Acres
Total	11,678 Acres
Total Improved Road	4.93 Miles
Total Maintained Trail	10.7 Miles

Location and Access

The Blue Mountain area is located approximately in Polk County, 10 miles east of Mena, Arkansas. The area is found on the Y City and Acorn 7.5 minute USGS quadrangle maps. Access to the area is gained via US Highway 270/71 to US 270 East and by a number of NFSRs, including road 8086 to Q18, 54, Q13 and 932. From the south, access is afforded by US Highway 270/71 to Forest Service/Polk County Road 76 and then to NFSR M40, M42, M43, M44, 749A, PK306, 749 and 7172.

Geography, Topography, and Vegetation

The Blue Mountain area is divided between two physiographic sub-sections, both a part of the larger Ouachita Mixed Forest – Meadow Province, Ouachita Mountains Section. Approximately 7,531 acres (64% of the area) are located in M231Ab, the West Central Ouachita Mountains Subsection and the remaining 4,147 acres (approximately 36%) are located in the Fourche Mountains Subsection. Physical features of the area are typical of the Ouachita Mountain region containing ridge and valley landscapes oriented on an east-west axis with distinct north-side and south-side vegetation communities. The ridges of the Blue Mountain area are elevated significantly above the surrounding terrain with Blue Mountain rising above 2,600 feet. The area is dominated by pine-hardwood forests where hardwoods dominate along the ridge top and upper half of the slope. The lower portions of the slope are predominately pine.

Drainages are intermittent or ephemeral containing no fishable sections. Wildlife species are typical for the area and include both game and non-game species.

Current Use and Attractions

The area is used primarily for dispersed recreation such as hiking, hunting, and OHV riding. Under the 1990 Amended Forest Plan, OHVs may use this area for motorized recreation, including cross-country travel. The Preferred Alternative and Alternatives B through D would consider cross-country motorized travel unsuitable Forest-wide and would include an objective to “designate and sign a system of roads and trails suitable for public access by motor vehicle, including, where appropriate off-highway vehicles, no later than October 2009.” Under Alternative D, motorized travel in the Blue Mountain area would be unsuitable due to its eligibility for wilderness recommendation. The Ouachita National Recreation Trail traverses the area from east to west and accommodates hikers and bicyclists along its route but is closed to motorized vehicle traffic. Blue Mountain itself is an attraction for hikers seeking challenge and a distant view.

The Fourche Mountain Trail, located to the east of the area’s eastern boundary is a popular OHV riding, bicycling, and horseback riding area.

A number of NFSRs are located inside the boundary of the eligible Blue Mountain area totaling 4.93-miles of combined length. However, none of these roads traverses the area or penetrates extensively into the interior. The roads are: Crater Road (Q18A, 0.56 miles); Adams Road (54, 1.12 miles); McConnell Road (0.26 Miles); Roost road (M40, 0.68 miles); Roost road Spur (M40, 0.36 miles); Gun Road (M42, 0.6 miles); Wolf Road (M42A, 0.67 miles) and Mix road (M45, 0.47 miles). A total of 2.21 miles of these roads are Maintenance Level 1, and 2.72 miles are Maintenance Level 2.

Appearance of the Area and Characteristics of Surrounding Contiguous Areas

The area has been significantly impacted by human activity such as roads and timber management. These areas are dispersed areas that are recovering and would become less conspicuous over time. The north side of Blue Mountain overlooks US Highway 270, a major route east-west across the center of the State. The highway supports heavy traffic, and the sights and sounds generated by the roadway and traffic are evident from the Blue Mountain area.

As stated above, the Ouachita National Recreation Trail traverses Blue Mountain along the ridge tops. The trail follows the district boundaries between the Forest's Mena and Poteau Ranger Districts and eventually traverses the entire Forest from east to west. There are no other existing federally managed recreation areas or sites in the area.

Capability

Natural Integrity and Appearance

Natural processes are operating within the area but are influenced by outside forces. Much of the area is naturally appearing; however, there are still signs of past human activity visible in the area. US Highway 270 is located at the foot of the slope on the north side of the area, and vehicles using this route may be seen and heard from within area boundary.

Opportunity For Solitude, Challenge, and Primitive Recreation

Opportunities for solitude, challenge and primitive recreation would be somewhat influenced by the area's location, which is near the high traffic US Highway 270 corridor, and previous, but not yet restored management and other human use activities.

Special Features (Ecological, Geological, Scientific, Educational, Scenic, Historical, and Rare and Endangered Plants and Animals)

The Fourche Mountain salamander (*Plethodon fourchensis*) is a Sensitive species found in the area of Blue Mountain. There are three other species that are tracked by the State of Arkansas but do not have special Forest or National status: narrow-leaved milkweed (*Asclepias stenophylla*), Pennsylvania sedge (*Carex pensylvanica*), and blazing star (*Liatris squarrosa var compacta*).

Size, Shape, and Manageability

Blue Mountain is compactly configured with Fourche Mountain, the dominant topographic feature, located in the center of the parcel. Management would be somewhat impacted as part of the unit is located in the Poteau/Cold Springs Ranger District and the other portion in the Mena/Oden Ranger District.

Boundary Conditions, Needs, and Management Requirements

The Blue Mountain area boundary was created from existing physical features such as roads, stream channels, and ridge tops. However, Blue Mountain has a significant portion of its boundary that follows unmarked section lines. This portion of the boundary would be more difficult for Forest Service personnel and the public to locate and would cost more to maintain.

Availability

Recreation And Tourism

Currently, the major recreation and tourism feature of the area is the Ouachita National Recreation Trail, which bisects the area in half from east to west. Hiking on the trail, some dispersed hunting, cross-country hiking, and some OHV uses comprise the most common recreational activities. The area is not a destination recreation area, contains no developed recreation facilities other than the Ouachita National Recreation Trail, and is used mainly by local residents who are familiar with the area. Local tourism is likely to increase if the area were designated as wilderness due to the ensuing publicity.

Wildlife

The Fourche Mountain Salamander (*Plethodon Fourchensis*), a sensitive species, is listed as occurring in the area. Otherwise, wildlife species found are typically the species that normally inhabit the area. The valley floor of Irons Fork Creek, to the south of Blue Mountain, is home to an endemic burrowing crayfish, *Procambarus reimeri*; however, this species is not found at the elevations characterizing the Blue Mountain area.

Water Availability and Use

Water is generally not available within the Blue Mountain area. A few intermittent or ephemeral streams exist along the ridgeline watershed of the area; however, they only carry water during and immediately after rainstorms or during significantly wet weather. There are no impoundments of any stream or natural lakes within the area.

Livestock, Timber, and Minerals

There are no grazing allotments in the area or adjacent to the area. The Blue Mountain area has a moderate minerals potential for natural gas and some of the minerals are in private ownership, especially along the northern slope of the central ridge. At this location, approximately five and one-half sections, (Section 31, T1N, R28W and Sections 33, 34, 35, 36 and one-half of Section 32, T1N, R29W) have withheld subsurface mineral rights. However, no surface evidence of mining activity is visible.

Timber resources within the area are not considered to be of significant value. Resource management of the area would be limited should wilderness designation be granted.

Management Considerations (Fire, insects/Disease and Non-Federal Lands)

Should a wilderness designation be granted for this area, this practice and associated beneficial uses could be lost or significantly curtailed. Wilderness designation for this area would also preclude the creation of wildlife food plots and ponds and would severely limit or eliminate maintenance of existing plots and ponds. Existing fire control techniques could be altered if the area is designated as wilderness. Mechanical ground suppression methods would no longer be available to fight wildfire without specific prior approval. Wilderness designation for this area would make insect and disease treatment more difficult and could increase the chances that outbreaks could increase beyond desirable limits before being controlled.

Need

See Wilderness Need – Roadless Area Evaluations at the end of this Appendix.

UPPER KIAMICHI WILDERNESS ADDITION

ID No. 09005

Overview

Size

National Forest System Lands	1,096 Acres
Private	0 Acres
Total	1,096 Acres
Total Improved Road	0.67 Miles
Total Maintained Trail	0 Miles

Location And Access

The Upper Kiamichi Addition is located adjacent to the southwestern edge of Upper Kiamichi River Wilderness on the Oklahoma Ranger District, Ouachita National Forest. The Addition is located on the Page U.S. Geological Survey (USGS) 7.5 minute quadrangle map and is bounded by Upper Kiamichi River Wilderness to the north and west, National Forest System Road (NFSR) 6032 to the south, and NFSR 6031 to the east. Access is provided by Oklahoma State Highway 60 and NFSR 6031 or U.S. Highway 259 and NFSR 6032. There is no vehicular access from the north.

Geography, Topography, and Vegetation

The Upper Kiamichi Addition is a part of the Fourche Mountain Subsection (M231Aa), Ouachita Mountains Section, of the Ouachita Mixed Forest – Meadow Province. Physical features are typical of the Ouachita Mountain region containing ridge and valley landscapes oriented on an east-west axis with distinct north-side and south-side vegetation communities. The mesic (moist) north slopes and drainages are vegetated by hardwood and hardwood-pine forests. Xeric (drier) south slopes are vegetated by mid-successional, native short-leaf pine and pine-oak forest types.

Drainages are intermittent or ephemeral containing no fishable sections. All drainages eventually empty into the Kiamichi River. The headwaters of Pushubbe Creek and other creeks to the east of Pushubbe Creek may, depending upon the steepness of the stream gradient and position in the watershed, potentially contain populations of the Forest's rarest crayfish, Kiamichi crayfish (*Orconectes saxatilis*). Further research is needed concerning this species; however, this research would be unlikely to require non-wilderness conforming activities to be successfully completed. The inclusion of the Upper Kiamichi Addition and the associated prohibition of most forest management practices could be viewed as a positive development for this crayfish species and for the endangered Ouachita rock pocketbook mussel (*Arkansia wheeleri*) located downstream in the Kiamichi River. Other wildlife and aquatic species are typical for the area and include both game and non-game species.

Current Use and Attractions

The area is used primarily for dispersed recreation such as hiking and hunting. OHVs, under 1990 Amended Forest Plan rules and regulations, may use this area for motorized recreation, including off-trail and off-road use of the forest floor. The Preferred Alternative and Alternatives B through D would consider cross-country

motorized travel unsuitable Forest-wide and would include an objective to “designate and sign a system of roads and trails suitable for public access by motor vehicle, including, where appropriate off-highway vehicles, no later than October 2009.” The close proximity of NFSR 6032 to the area allows easy access to the addition’s features.

Appearance Of The Area And Characteristics Of Surrounding Contiguous Areas

Past management activities are not evident in the area of the proposed addition. The area is regaining a natural appearance as vegetation matures. A single road, K42C, 0.7 miles long and assigned to Maintenance Level 1, is located inside the proposed boundary of the addition. The eastern boundary of the addition is NFSR 6031 and K43.

The area contains no non-native planted vegetation, wildlife plots, or other such improvements. The Ouachita National Recreation Trail roughly parallels the boundary between the existing Upper Kiamichi River Wilderness and the proposed Addition. The trail meanders in and out of the area along its route from east to west.

Areas to the north, east, and west are existing wilderness areas with a natural appearance. NFSR 6032 to the south and NFSR 6031 and K43, which enter the existing Wilderness, are the only development features within the general area.

Wilderness

Natural Integrity And Appearance

The majority of the Upper Kiamichi Addition is naturally appearing with little sign of human use. There has been no timber harvest in the area for the past ten years, and little evidence of forest management practices is evident. NFSR 6032 bounds the area to the south and NFSR 6031 and K43 to the east. Vehicles using these routes may be seen and heard from within the Addition. However, the Addition would assist in further buffering the remaining Upper Kiamichi River Wilderness from similar impacts and assist in providing a more primitive recreation experience within the existing Wilderness.

Opportunity For Solitude, Challenge, and Primitive Recreation

Opportunities for solitude, challenge, and primitive recreation would not be significant within the 1,096-acre Addition; however, the effects of sight and sound buffering in the adjacent, existing wilderness area and increased visibility of the revised Wilderness boundary by the public would have a net positive effect for visitors using all parts of the Upper Kiamichi River Wilderness. In addition, a simplified and more visible wilderness boundary, using the existing NFSRs already located at this location would aid in administrative management of the Wilderness.

Special Features (Ecological, Geological, Scientific, Educational, Scenic, Historical, and Rare and Endangered Plants and Animals)

The Upper Kiamichi Addition is located in the Fourche Mountains Subsection of the Ouachita Mixed Forest – Meadow Province. The proposed Upper Kiamichi Addition, combined with the existing designated wilderness within the Ouachita Mixed Forest – Meadow Province would comprise nearly 1 percent (0.84 percent) of the Province.

There are no occurrence records of PETS species within the boundary of the Upper Kiamichi Addition.

Size, Shape, and Manageability

The Upper Kiamichi Addition would add 1,096 acres to the southwestern end of the existing Upper Kiamichi River Wilderness. The use of NFSR 6032 as the western boundary and NFSR 6031 as the eastern boundary for the total area would aid in the manageability of the Wilderness by rendering these boundaries more visible for both the public and Forest Service employees.

Availability

Recreation and Tourism

The addition of 1,096 acres to Upper Kiamichi River Wilderness is not expected to significantly impact recreation opportunities or tourism in the area.

Wildlife

There are no known occurrence records of PETS species in the area. There are no designations of essential or critical habitat in this parcel. The Kiamichi crayfish (*Orconectes saxatilis*), an endemic species and a Sensitive species, may be present in some streams within the addition area. Also, the endangered Ouachita rock pocketbook mussel (*Arkansia wheeleri*) is located downstream in the Kiamichi River.

Water Availability and Use

Streams in the Upper Kiamichi addition area are intermittent or ephemeral and do not flow year-round. There are no springs, seeps, or other known aquatic resources that would be impacted by wilderness designation.

Livestock, Timber, and Minerals

There are no grazing allotments in or adjacent to the Upper Kiamichi Addition.

The Upper Kiamichi Addition has a moderate potential for gas exploration and gas extraction. Should the Upper Kiamichi Addition be designated as Wilderness, the designation would eliminate the possibility of minerals exploration and development from the designated lands, except in those cases where minerals are privately owned under the Federal surface.

Management Considerations (Fire, insects/Disease and Non-Federal Lands)

As a part of a larger fire sub-climax ecosystem, the Upper Kiamichi addition has been managed in the past using prescribed fire as one management tool. Should a wilderness designation be granted for this area, this practice and associated beneficial uses could be lost or significantly curtailed. Wilderness designation for this area would also preclude the creation of wildlife food plots and ponds.

Existing fire control techniques could be altered if the area is designated as wilderness. Mechanical ground suppression methods would no longer be available to fight wildfire without specific prior approval. Wilderness designation for this area would make insect and disease treatment more difficult, and could increase the chances that outbreaks could increase beyond desirable limits before being controlled.

Need

See Wilderness Need – Roadless Area Evaluations at the end of this Appendix.

POTEAU MOUNTAIN WILDERNESS (EAST) ADDITION

ID No. 09006

Overview

Size

National Forest System Lands	77 Acres
Private	0 Acres
Total	77 Acres
Total Improved Road	0 Miles
Total Maintained Trail	0 Miles

Location and Access

The Poteau Mountain (East Unit) Addition is located on the western edge of the East Unit of Poteau Mountain Wilderness Area and in the northern half of this Unit. The Addition is located on the Hon U.S. Geological Survey (USGS) 7.5 minute quadrangle map. The area is bounded by Poteau Mountain Wilderness Area (East Unit) to the north, south, and east and Kings Creek, NFSR P001 and the Poteau Mountain Management Area (Management Area 1b) to the west. The area may be accessed by NFSR P001 on foot as this road is currently closed to vehicular traffic. Vehicle access to the general area is provided by NFSR 158.

Geography, Topography, and Vegetation

The Poteau Mountain Addition is a part of the Southeastern Mixed Forest Province, Western Arkansas Valley Mountains subsection. The area is situated on the western slope of East Poteau Mountain with elevation ranges from 600 feet near Kings Creek to more than 1,000-feet near the adjacent boundary with the East Unit of Poteau Mountain Wilderness. Physical features are typical of the Ouachita Mountain region containing ridge and valley landscapes with drainages vegetated by hardwood and hardwood-pine forests. Xeric (drier) south slopes are vegetated by mid-successional, native short-leaf pine and pine-oak forest types.

Kings Creek is a perennial stream which flows north to empty into the Petit Jean River. No species of concern are known to inhabit Kings Creek at this location. The Red-cockaded Woodpecker (*Picoides borealis*) is known to occur south of the Addition; however, no members of this species are known to reside inside or near the proposed Addition itself. Resident wildlife and aquatic species are typical for the area and include both game and non-game species.

Current Use and Attractions

The area is used primarily for dispersed recreation such as hiking and hunting. OHVs, under the 1990 Amended Forest Plan rules and regulations, may use NFSR P001 for motorized recreation, including off-road use of the forest floor. However, Alternatives B-E would establish OHV use as unsuitable for entire Forest, making OHV use within the Poteau Mountain Wilderness Addition unsuitable due both to its eligibility for wilderness classification (under Alternatives C, D, and E) and because of the unsuitable classification. The close proximity of NFSR 158 to the area allows easy access to the Addition's features.

Appearance of the Area and Characteristics of Surrounding Contiguous Areas

The area is comprised of primarily composed of a pine-hardwood mix with typical plant species found in the understory. An ice storm in 2000 toppled numerous trees, and these trees were left in place on the forest floor. With the exception of some dispersed recreation use, the area shows little sign of human impact.

The area contains no non-native planted vegetation, wildlife plots, or other improvements. There are no trails, developed recreation areas, or other public facilities located within the area.

Land to the north, east, and south is an existing Wilderness with a natural appearance. NRSR 158 (the Poteau Mountain Rustic Auto Tour), is located to the south of the area and comprises the southern boundary for both the East and West Units of Poteau Mountain Wilderness.

Capability

Natural Integrity and Appearance

The majority of the Poteau Mountain Wilderness Addition is naturally appearing with little sign of human use. There has been no timber harvest in the area for the immediate past, and little evidence of forest management practices is evident. NRSR 158 is located south and NRSR P001 west. Vehicles using these routes may be heard from within the Addition. However, the Addition would assist in further buffering the remaining East Unit of Poteau Mountain Wilderness from traffic impacts and assist in providing a more primitive recreation experience within the existing wilderness area.

Opportunity For Solitude, Challenge, and Primitive Recreation

Opportunities for solitude, challenge, and primitive recreation would not be significant within the 77-acre Addition alone; however, the effects of sight and sound buffering in the adjacent, existing Wilderness and increased visibility of the revised Wilderness boundary by the public would have a net positive effect for visitors using all parts of the of the East Unit of Poteau Mountain Wilderness. In addition, a simplified and more visible Wilderness boundary, using the existing NRSRs already located at this location would aid in administrative management of the Wilderness.

Special Features (Ecological, Geological, Scientific, Educational, Scenic, Historical, and Rare and Endangered Plants and Animals)

The Poteau Mountain Wilderness Addition is located in the Southeastern Mixed Forest Province, a very large area comprising nearly 124 million acres but containing very few wilderness areas. The proposed Poteau Mountain Addition of 77 acres would make a modest, but important, contribution toward increasing wilderness representation in that Province.

Size, Shape, and Manageability

The Poteau Mountain Wilderness Addition would add 77 acres to the western edge of the East Unit of Poteau Mountain Wilderness. The use of NRSR P001 as the western boundary for the Wilderness would aid in the manageability of the Wilderness by rendering these boundaries more visible for both the public and Forest Service employees.

Availability

Recreation and Tourism

The addition of 77 acres to Poteau Mountain Wilderness is not expected to significantly impact recreation opportunities or tourism in the area.

Wildlife

There are no occurrence records of PETS species in the Addition area. There are no designations of essential or critical habitat in this parcel. Red cockaded Woodpecker (*Picoides borealis*), an Endangered species, are known to inhabit areas to the south but have not been located within the addition.

Water Availability and Use

Kings Creek, the major drainage passing adjacent to the west boundary of the proposed addition is a perennial stream within its lower reaches. At the higher elevations, the stream becomes intermittent depending upon annual rainfall. There are no springs, seeps, or other known aquatic resources that would be impacted by wilderness designation.

Livestock, Timber, and Minerals

There are no grazing allotments in or adjacent to proposed addition area.

The Poteau Mountain Addition, where minerals are privately owned under the Federal surface, would remain subject to owner access their mineral estate regardless of the area's designation. Should the owners of the mineral estate elect to exercise their rights to access these minerals, the impacted addition area may be removed from further consideration as potential wilderness.

The area is located on a steep western slope and has not been harvested commercially in the recent past. Should the wilderness designation be granted for this addition, there would be no loss of suitable timber base as the area is currently classified as unsuitable for timber production.

Management Considerations (Fire, insects/Disease and Non-Federal Lands)

As a part of a larger fire sub-climax ecosystem, the Poteau Mountain Wilderness Addition has been managed in the past using prescribed fire as one management tool. Should a wilderness designation be granted for this area, this practice and associated beneficial uses could be lost or significantly curtailed. Wilderness designation for this area would also preclude the creation of wildlife food plots and ponds.

Existing fire control techniques could be altered if the area is designated as wilderness. Mechanical ground suppression methods would no longer be available to fight wildfire without specific prior approval. Wilderness designation for this area would make insect and disease treatment more difficult, and could increase the chances that outbreaks could increase beyond desirable limits before being controlled.

The entire 77-acre parcel is now in Forest Service management.

Need

See the following Wilderness Need – Roadless Area Evaluations.

BLACK FORK MOUNTAIN WILDERNESS ADDITION

ID No. 09007

Overview

Size

National Forest System Lands	406 Acres
Private	0 Acres
Total	406 Acres
Total Improved Road	0 Miles
Total Maintained Trail	0 Miles

Location and Access

Black Fork Mountain Addition is located adjacent to the eastern end of Black Fork Mountain Wilderness on the Mena Ranger District. The Addition is located on the Nimrod Southeast U.S. Geological Survey (USGS) 7.5 minute quadrangle map in Polk and Scott Counties, Arkansas. The area is bounded by Black Fork Mountain Wilderness to the west, U.S. Highway 270 to the south, the community of Eagle Gap to the east, and NFSR 516 to the north. The area is accessed by U.S. Highway 270, and NFSR 516.

Geography, Topography, and Vegetation

The Black Fork Addition, a part of the Fourche Mountain Subsection (M231Aa), Ouachita Mountains Section – Meadow Province, physical features consist of a steep ridge and point with ridgelines oriented on an east-west axis with distinct north-side and south-side vegetation communities. The mesic (moist) north slopes and drainages are vegetated by hardwood and hardwood-pine forests. Xeric (drier) south slopes are vegetated by mid-successional, native short-leaf pine.

Drainages are intermittent or ephemeral. Wildlife species are typical for the area and include both game and non-game species.

Current Use and Attractions

The area is used primarily for dispersed recreation such as hiking and hunting. Under the 1990 Amended Forest Plan, OHVs could use this area for motorized recreation, including off-trail and off-road use of the forest floor. Alternatives C, D, and E treat such motorized use within the Black Fork Mountain Addition as unsuitable.

Appearance of the Area and Characteristics of Surrounding Contiguous Areas

The area is heavily influenced by human activity, is located adjacent to a small residential community (Eagle Gap) and U.S Highway 270, as well as a currently functioning railroad line. A significant wildfire destroyed much of the mature vegetation approximately 20 years ago, leaving thick even-age regeneration covering much of the area.

Capability

Natural Integrity and Appearance

Natural processes are operating within the area but are significantly influenced by adjacent outside forces (functioning rail line and Federal Highway 270).

Opportunity for Solitude, Challenge, and Primitive Recreation

Opportunities for solitude, challenge and primitive recreation would be difficult in this area as a result of human activities taking place immediately outside of the boundary. Sights and especially sounds (highway and freight train noises) easily penetrate into the interior of this small parcel. The ability to see, from the higher points along the Black Fork Mountain Ridge in the Addition's center, vehicle lights, and residential lighting at night further detract from the potential of this area for a quality wilderness experience.

Special Features (Ecological, Geological, Scientific, Educational, Scenic, Historical, and Rare and Endangered Plants and Animals)

Black Fork Mountain is located in the Fourche Mountains Subsection of the Ouachita Mixed Forest – Meadow Province (M231Aa). The Black Fork Mountain Addition and the proposed Flatside Addition, combined with the Flatside Wilderness Area, Black Fork Mountain Wilderness, Upper Kiamichi Wilderness, and Caney Creek Wilderness, would comprise nearly one percent (0.84 percent) of the Ouachita Mixed Forest – Meadow Province. The Black Fork Mountain Addition would encompass the eastern end of Black Fork Mountain which continues westward into the Black Fork Mountain Wilderness. No other features of note exist within the area. The Rich Mountain Salamander (*Plethodon ouachitae*) is known to occur within the area.

Size, Shape, and Manageability

The Black Fork Mountain Addition would add 406 additional acres to the eastern end of the existing Black Fork Mountain Wilderness area.

Boundary Conditions, Needs, and Management Requirements

The Black Fork Mountain addition follows an unmarked boundary line near the toe of Black Fork Mountain creating a 'V' shaped parcel. None of the existing boundaries parallel existing roads, streams or other physical land features.

Availability

Recreation and Tourism

The addition of this 406-acre parcel to the Black Fork Mountain Wilderness area would not be expected to appreciably impact recreation opportunities or tourism in the area.

Wildlife

One occurrence record of Federally Proposed, Endangered, or Threatened (PET) species has been recorded in the area: the Rich Mountain Salamander (*Plethodon ouachitae*).

Water Availability and Use

Streams in the Black Fork Mountain Addition are intermittent or ephemeral and do not flow year-round. There are no known aquatic resources that would be impacted by wilderness designation.

Livestock, Timber, Minerals, and Land Uses

There are no livestock grazing allotments inside or adjacent to the proposed Addition.

Should the Black Fork Mountain Addition be designated as wilderness, the designation would eliminate the possibility of minerals exploration and development from the designated lands. Both the land surface and subsurface (mineral rights) in the area are federally owned. There are no rights-of-way, easements or other encumbrances on the land.

The area is not frequently entered for silvicultural treatments, and the small size of the proposed addition would represent an almost imperceptible reduction in overall forest timber resources. The area is currently located in Management Area 14.

Management Considerations (Fire, insects/Disease and Non-Federal Lands)

As a part of a larger fire sub-climax ecosystem, the Black Fork Mountain Addition has been managed in the past using prescribed fire as one management tool. Should a wilderness designation be granted for this area, this practice and associated beneficial uses could be lost or significantly curtailed.

Existing fire control techniques could be altered if the area is designated as wilderness. Mechanical ground suppression methods would no longer be available to fight wildfire without specific prior approval. Wilderness designation would make insect and disease treatment more difficult, and could increase the chances that outbreaks could increase beyond desirable limits before being controlled.

Need

See Wilderness Need – Roadless Area Evaluations at the end of this Appendix.

OTHER AREAS EVALUATED

Bee Mountain (7,327 acres) and Ashford Peak (7,300 acres) in McCurtain County, Oklahoma, were identified as inventoried roadless areas during a significant amendment to the Forest Plan completed in 2002 and were reviewed during this Plan revision for wilderness suitability. Ashford Peak and Bee Mountain have been and are currently managed as part of MA 22—Renewal of the Shortleaf Pine-Bluestem Ecosystem and Habitat for the Red-cockaded Woodpecker (RCW). The review found that there was no new information or changed circumstances to warrant the changing recommendations made during the 2002 amendment, which was to continue to manage these roadless areas in MA 22. The need to provide a Habitat Management Area for the Endangered RCW adjacent to the McCurtain County Wilderness Area (where the bird has a breeding population) makes wilderness designation of these areas unsuitable. Bee Mountain and Ashford Peak would be managed as part of Management Area 22 under all alternatives.

Wilderness Need – Roadless Area Evaluations

Introduction

The roadless analysis for the Ouachita National Forest was completed, as required by 36 CFR 219.17, during Plan Revision, and all areas that met the requirements set forth in FSH 1909.12, Chapter 7, Section 7.1 (roadless) have been identified. These areas were further reviewed using Section 2(c) of the 1964 Wilderness Act to determine potential recommendations to include areas in the National Wilderness System. Prior to making a recommendation for wilderness designation, the need for more wilderness acres on the Ouachita National Forest must be determined.

Methodology

Actual use of each of the Ouachita National Forest's Wilderness can only be estimated. Since a key factor in the wilderness experience is solitude, there are no practical ways to record each visit or to gather data concerning visit duration, point of origin of the visitor, or the satisfaction of each visitor with their wilderness experience. Some reports and studies have been completed in recent years where wilderness data are available. These studies include: The National Visitor Use Monitoring (NVUM) survey completed for the Ouachita in 2000; Outdoor Recreation in American Life, 1999, H. Ken Cordell and others; the Ouachita and Ozark National Forests Recreation Realignment Report, 2001, H. Ken Cordell & Christine Overdeest; and the Ozark-Ouachita Highlands Assessment, USDA Forest Service, General Technical Reports SRS-34 & 35, December 1999, Southern Research Station. Limited use data are available from trail sign-in stations located at the entrance to selected wilderness trails.

Although it would be helpful to have more precise information concerning existing wilderness use, existing wilderness supply, and potential wilderness demand increases (or decreases), these components of a calculated wilderness demand are not largely available and would not reflect a complete wilderness need assessment. Use alone cannot adequately predict additional need for more wilderness. In the absence of adequate numerical information upon which to base wilderness demand, a practical, descriptive, consensus method to measure wilderness supply, existing wilderness use, and proposed wilderness use increases over the next planning period was developed employing existing records, known wilderness area conditions, wilderness visitation demand projections and the Recreation Opportunity Spectrum's setting indicators.

A NVUM survey was completed for the Ouachita National Forest in August 2001 for the six congressionally designated wilderness areas located within the Ouachita National Forest. These areas are:

Flatside Wilderness:	9,507 Acres
Dry Creek Wilderness:	6,310 Acres
Caney Creek Wilderness:	14,460 Acres
Poteau Mountain Wilderness:	11,299 Acres
Black Fork Mountain Wilderness:	13,579 Acres*
Upper Kiamichi River Wilderness:	10,819 Acres*
Total:	<u>65,974 Acres*</u>

*includes some private in-holdings

This one snapshot survey for recreation and wilderness use on the Forest was the only comprehensive study completed in the period between the completion of the 1990 Amended Forest Plan and the revision of that Plan. The study was completed for only one year and is, therefore, more of a snapshot sample, rather than actually reflective of sustained use of wilderness areas over time. The information, however, presented in this study is valuable in adding to the overall word picture of the condition, use, and supply of wilderness on the Forest.

In addition to the NVUM data, the Ouachita National Forest Wilderness Manager has compiled a trip log of his visits from 1995 through 2003 to Caney Creek Wilderness, the most well known and most publicly used of the six Ouachita National Forest wilderness areas. Information from these monitoring trips is summarized in Table G.1.

Table G.1 Information from Caney Creek Wilderness Monitoring Trips (1995-2003)

Year	Days Monitored in the High Use Seasons	Contacts Along Trail	Average Contacts per Day Monitored	Groups with 10 or More	Campsites Occupied	
					Within Sight of Trail	Within Sight/ Sound of Others
1995	19	22	1.16	5	13	8
1996	22	11	0.50	6	8	2
1997	21	45	2.14	6	3	0
1998	32	45	1.41	10	6	0
1999	23	35	1.52	8	1	0
2000	10	6	0.60	1	0	0
2001	12	12	1.00	1	0	0
2002	15	8	0.53	4	0	0
2003	15	10	0.67	3	0	0

Findings

The August 2001 NVUM estimated wilderness visits of 69,138 for calendar year 2000, or 1.05 visits per wilderness system acre. This same study assessed visitor satisfaction for a number of features at each area ranging from scenery, parking, employee helpfulness, and condition of the natural environment. This information may be used to indicate the level of use at these Wildernesses—lower satisfaction levels tend to indicate crowding and over use, whereas higher satisfaction levels may indicate lower use and an acceptable number of wilderness visitors. Table 10 in the NVUM, Satisfaction of Visitors at Designated Wilderness on Ouachita National Forest, displays the range of visitor satisfaction with 1 = not very satisfied/important and 5 = very satisfied/important. The study indicated a high to moderate degree of satisfaction for most features, with a notable exception being wilderness signage, with a rating of only 2.2.

Wilderness visitors rated the following categories as indicated: scenery (5.0), condition of the natural environment (4.0), condition of forest trails (3.1), and attractiveness of the forest landscape (4.9). These ratings are consistent with low impacts to wilderness features associated with low wilderness user populations. These satisfaction ratings would, in turn, suggest a low overall use rate for the wildernesses.

Southern Illinois University at Carbondale completed a study entitled: Campsite Impact in South Central Wilderness Areas, October 1994, Douglas McEwen and David Cole, which documented a failure of fourteen campsites in the Caney Creek Wilderness to meet established Limits of Acceptable Change (LAC). These areas were reviewed by Forest staff

and a remediation plan was formulated. Twelve of the sites were actively restored (two had recovered on their own when a restoration project was begun in 1996), and design changes were made to adapt the trail system in the area of these campsites to a loop system which essentially corrected problems of overuse. Overuse of these campsites was not observed after the initial restoration efforts and redesign of the trail system. No other wilderness areas were found to require restoration actions.

Data from monitoring visits to Caney Creek Wilderness from 1995 through 2003 show no increase in the average number of contacts per day with other people on the trails or in campsites. Instead, the number has remained consistently low. Encounters with large groups (10 or more people) varied very little from 1995 through 1999, averaging about one per three visits, and then dropping to one per ten visits for two years before returning to somewhat less than one per three visits in 2002. Although total numbers of visitors to Caney Creek Wilderness are not known, the available monitoring data point to relatively stable use patterns but not increasing demand.

Population trends within the Forest draw area have been assessed and when applied to the numbers of visitors identified during the NVUM study completed in August 2001, resulted in a slight increase in use expectation for wilderness areas on the Ouachita National Forest. Table G.2 lists these expected increases.

Table G.2 Expected Increases in Wilderness Use

Year	Percent increase	Annual Wilderness Visits
2000	-	69,138
2010	1	69,829
2020	5.7	73,810
2030	1.8	75,138
2040	1.8	75,491

With existing wilderness areas not impacted or overcrowded under existing usage (69,138 visits per year, total) it is unlikely that an additional 6,400 additional visits would cause appreciable crowding or overuse. Since the planning period is typically 10–15 years, and the anticipated increase over this time is approximately 4,600 additional visits, wilderness on the Ouachita National Forest appears to be capable of absorbing the projected additional use with little impact to the physical characteristics of the areas or to the quality the visitor's experience.

An additional reason to consider adding to the National Wilderness System would be to provide a habitat for a species of plant or animal that is reliant upon or prefers natural processes and/or the lack of human presence for its well-being. There are no known plant or animal species that have such dependencies on the Ouachita National Forest; therefore, additional acres are not required for this purpose.

Little interest specific to wilderness demand was expressed by the public or government agencies during scoping and at public and interagency meetings focusing on Plan Revision issue identification, OHV use, and Forest Plan alternatives. The relatively small response to

this issue supports the conclusion that, at this time, adding new wilderness areas on the Ouachita National Forest is not a significant public concern.

Nationally, wilderness has been recognized as a vehicle to preserve, unaltered, representative samples of each of the Nation's ecoregions for the future. A guideline of one percent of each ecoregion to be preserved by wilderness designation has been recommended by the Forest Service and was used in the Roadless Review and Evaluation (RAREII) process. Each of the Forest's ecoregions was reviewed to determine the amount of wilderness contained in each and that total was compared to the one percent goal. The Ouachita National Forest contains the entire wilderness in Ecoregion M321A, Ouachita Mixed Forest – Meadow Province, with a total representation of 0.88 percent. In Ecoregion 231G and 231E, Southeastern Mixed Forest, the Ouachita National Forest contained 0.01424 percent; however, this ecoregion extends east into the Appalachian Mountains and contains 83,843 acres of wilderness located on six National Forests. The total representation Ecoregion 231 in wilderness for the U.S. is 0.678 percent. The Ouachita National Forest has almost reached the goal of one percent of Ecoregion M231 in wilderness and, together with five other states, has reached approximately 70 percent of the goal for Ecoregion 231.

Based upon the information available, the lack of crowding conditions, and relatively low impacts associated with the Ouachita National Forests wilderness areas; it has been determined that there is little demand for additional wilderness. Nonetheless, a recommendation to add approximately 620 acres to Flatside Wilderness, 77 acres to the east unit of Poteau Mountain Wilderness, and 1,096 acres to Upper Kiamichi River Wilderness has been made in an effort to establish a more manageable and identifiable wilderness boundary for each area and to add areas that currently possess wilderness values. In the case of the proposed Flatside Wilderness addition, this area contains outstanding scenic quality. No other recommended additions are contemplated at this time.

Wilderness Accessibility

Introduction

After qualifying areas of the Ouachita National Forest were identified as meeting roadless criteria, they were further evaluated for their wilderness qualities as indicated in the Roadless Area Evaluations section found earlier in Appendix B. To adequately evaluate the need to include these areas as additional wilderness recommendations, a wilderness needs study was completed to assess the current demand on existing wildernesses and to project potential future demand for additional wilderness. An accessibility evaluation was completed to determine if major population centers (population centers are urbanized areas of 50,000 or more persons as defined in the Census of Population and Housing, US Department of Commerce, Economics and Statistics Administration, Bureau of the Census) which were within the Forest's 250-mile draw area were served by at least one wilderness area.

Methodology

The process first identified all the major population centers with 50,000 population or greater within 250-miles (see the Forest's Draw Area Map, Figure G.1, below) of the Forest boundary.

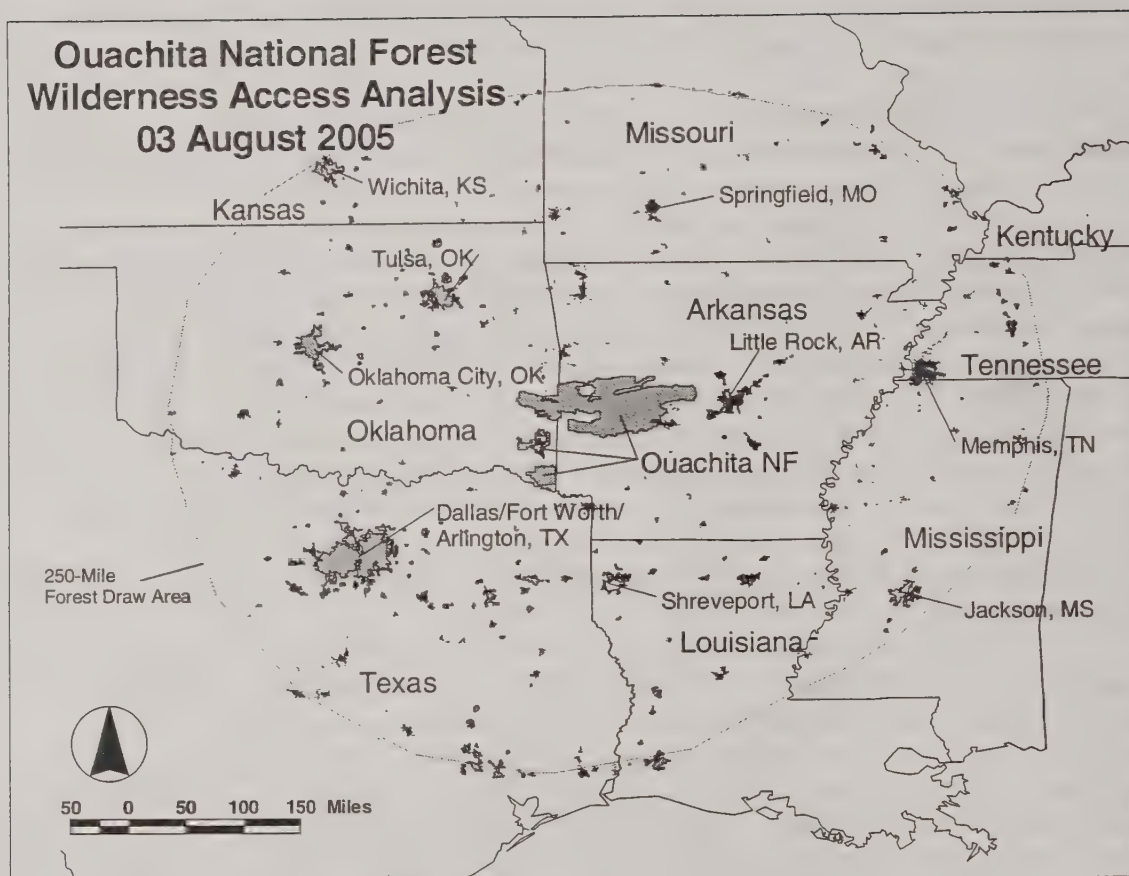


Figure G.1 Major Population Centers with 50,000 Population Or Greater within 250-Miles of the Forest

An analysis of population areas which were located within the 250-mile draw area of the Forest was completed to determine if there were population centers that did not have access (were more than 250-miles distance) to wilderness. Table G.3 indicates which population is served by wilderness on the Ouachita National Forest and by which wilderness area. Populations not served by a listed wilderness are indicated by a zero (not accessible) or a one (accessible) located across from the population center name and under the column for each of the Forest's wilderness areas. A totals column (last column to the right) tallies all wilderness areas accessible to a particular population center or indicates zero if none is accessible.

Table G.3 Ouachita NF Draw Area Major Population Centers and Accessible Wilderness Areas (1=within 250 mile range, 0=beyond 250 mile range)

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Cairo, IL	Cape Girardeau-Sikeston-Jackson, MO-IL	0	0	0	0	0	0	0
Cape Girardeau, MO--IL	Cape Girardeau-Sikeston-Jackson, MO-IL	0	0	0	0	0	0	0
West Point, MS	Columbus-West Point, MS	0	0	0	0	0	0	0

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Cleveland, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Conroe, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Dayton, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Grangerlan, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Houston, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Huntsville, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Lake Conroe Westshore, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Liberty, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Patton Village, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
The Woodlands, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Tomball, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Willis, TX	Houston-Baytown-Huntsville, TX	0	0	0	0	0	0	0
Harrisonville, MO	Kansas City-Overland Park-Kansas City, M	0	0	0	0	0	0	0
DeQuincy, LA	Lake Charles-Jennings, LA	0	0	0	0	0	0	0
Lake Charles, LA	Lake Charles-Jennings, LA	0	0	0	0	0	0	0
Vinton, LA	Lake Charles-Jennings, LA	0	0	0	0	0	0	0
Altus, OK	other	0	0	0	0	0	0	0
Beaumont, TX	other	0	0	0	0	0	0	0
Caldwell, TX	other	0	0	0	0	0	0	0
California, MO	other	0	0	0	0	0	0	0
College Station--Bryan, TX	other	0	0	0	0	0	0	0
Corinth, MS	other	0	0	0	0	0	0	0
Dublin, TX	other	0	0	0	0	0	0	0
Gatesville, TX	other	0	0	0	0	0	0	0
Hearne, TX	other	0	0	0	0	0	0	0
Jefferson City, MO	other	0	0	0	0	0	0	0
Killeen, TX	other	0	0	0	0	0	0	0
McGregor, TX	other	0	0	0	0	0	0	0
Orange, TX	other	0	0	0	0	0	0	0
Sedalia, MO	other	0	0	0	0	0	0	0
Silsbee, TX	other	0	0	0	0	0	0	0
Starkville, MS	other	0	0	0	0	0	0	0

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Stephenville, TX	other	0	0	0	0	0	0	0
Temple, TX	other	0	0	0	0	0	0	0
Tipton, MO	other	0	0	0	0	0	0	0
Vernon, TX	other	0	0	0	0	0	0	0
Waco, TX	other	0	0	0	0	0	0	0
De Soto, MO	St. Louis-St. Charles-Farmington, MO-IL	0	0	0	0	0	0	0
Fulton, KY--TN	Union City-Martin, TN-KY	0	0	0	0	0	0	0
Martin, TN	Union City-Martin, TN-KY	0	0	0	0	0	0	0
Wichita, KS	Wichita-Winfield, KS	0	0	0	0	0	0	0
Cape Girardeau, MO--IL	Cape Girardeau-Sikeston-Jackson, MO-IL	0	0	0	0	1	0	1
Chaffee, MO	Cape Girardeau-Sikeston-Jackson, MO-IL	0	0	0	0	1	0	1
Scott City, MO	Cape Girardeau-Sikeston-Jackson, MO-IL	0	0	0	0	1	0	1
Sikeston, MO	Cape Girardeau-Sikeston-Jackson, MO-IL	0	0	0	0	1	0	1
De Ridder, LA	Fort Polk South-De Ridder, LA	1	0	0	0	0	0	1
Fort Polk, LA	Fort Polk South-De Ridder, LA	1	0	0	0	0	0	1
Leesville, LA	Fort Polk South-De Ridder, LA	1	0	0	0	0	0	1
North Huntsville (Ellis Unit), TX	Houston-Baytown-Huntsville, TX	1	0	0	0	0	0	1
Dyer, TN	Jackson-Humboldt, TN	0	0	0	0	1	0	1
Henderson, TN	Jackson-Humboldt, TN	0	0	0	0	1	0	1
Humboldt, TN	Jackson-Humboldt, TN	0	0	0	0	1	0	1
Jackson, TN	Jackson-Humboldt, TN	0	0	0	0	1	0	1
Milan, TN	Jackson-Humboldt, TN	0	0	0	0	1	0	1
Trenton, TN	Jackson-Humboldt, TN	0	0	0	0	1	0	1
Canton, MS	Jackson-Yazoo City, MS	0	0	0	0	1	0	1
Crystal Springs, MS	Jackson-Yazoo City, MS	0	0	0	0	1	0	1

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Hazlehurst, MS	Jackson-Yazoo City, MS	0	0	0	0	1	0	1
Jackson, MS	Jackson-Yazoo City, MS	0	0	0	0	1	0	1
Langford, MS	Jackson-Yazoo City, MS	0	0	0	0	1	0	1
Richland, MS	Jackson-Yazoo City, MS	0	0	0	0	1	0	1
Harrisonville, MO	Kansas City-Overland Park-Kansas City, M	0	0	0	1	0	0	1
Brownsville, TN	other	0	0	0	0	1	0	1
Corinth, MS	other	0	0	0	0	1	0	1
Dyersburg, TN	other	0	0	0	0	1	0	1
Electra, TX	other	0	1	0	0	0	0	1
Natchez, MS--LA	other	0	0	0	0	1	0	1
Pontotoc, MS	other	0	0	0	0	1	0	1
Saltillo, MS	other	0	0	0	0	1	0	1
Tupelo, MS	other	0	0	0	0	1	0	1
Farmington, MO	St. Louis-St. Charles-Farmington, MO-IL	0	0	0	0	1	0	1
Park Hills, MO	St. Louis-St. Charles-Farmington, MO-IL	0	0	0	0	1	0	1
Potosi, MO	St. Louis-St. Charles-Farmington, MO-IL	0	0	0	0	1	0	1
Sullivan, MO	St. Louis-St. Charles-Farmington, MO-IL	0	0	0	0	1	0	1
Martin, TN	Union City-Martin, TN-KY	0	0	0	0	1	0	1
Union City, TN	Union City-Martin, TN-KY	0	0	0	0	1	0	1
Louisburg, KS	Kansas City-Overland Park-Kansas City, M	0	0	1	1	0	0	2
Osawatomie, KS	Kansas City-Overland Park-Kansas City, M	0	0	1	1	0	0	2
Paola, KS	Kansas City-Overland Park-Kansas City, M	0	0	1	1	0	0	2
Alexandria, LA	other	1	0	0	0	1	0	2
Covington, TN	other	0	0	0	1	1	0	2
Ferriday, LA	other	1	0	0	0	1	0	2
Holly Springs, MS	other	0	0	0	1	1	0	2
Iowa Park, TX	other	0	1	0	0	0	1	2
Malden, MO	other	0	0	0	1	1	0	2

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Munford, TN	other	0	0	0	1	1	0	2
Natchez, MS--LA	other	1	0	0	0	1	0	2
Oxford, MS	other	0	0	0	1	1	0	2
Wichita Falls West (Allred Unit), TX	other	0	1	0	0	0	1	2
Wichita Falls, TX	other	0	1	0	0	0	1	2
Windsor, MO	other	0	0	1	1	0	0	2
El Dorado, KS	Wichita-Winfield, KS	0	0	1	0	0	1	2
Granbury, TX	Dallas-Fort Worth, TX	1	1	0	0	0	1	3
Mineral Wells, TX	Dallas-Fort Worth, TX	1	1	0	0	0	1	3
Pecan Plantation, TX	Dallas-Fort Worth, TX	1	1	0	0	0	1	3
Yazoo City, MS	Jackson-Yazoo City, MS	1	0	0	1	1	0	3
Blytheville, AR	other	0	0	1	1	1	0	3
Burkburnett, TX	other	0	1	1	0	0	1	3
Diboll, TX	other	1	1	0	0	0	1	3
Greenwood, MS	other	1	0	0	1	1	0	3
Grenada, MS	other	1	0	0	1	1	0	3
Kennett, MO	other	0	0	1	1	1	0	3
Munford, TN	other	0	0	1	1	1	0	3
Poplar Bluff, MO	other	0	0	1	1	1	0	3
Rolla, MO	other	0	0	1	1	1	0	3
St. James, MO	other	0	0	1	1	1	0	3
Vicksburg, MS	other	1	0	0	1	1	0	3
West, TX	other	1	1	0	0	0	1	3
Augusta, KS	Wichita-Winfield, KS	0	1	1	0	0	1	3
El Dorado, KS	Wichita-Winfield, KS	0	1	1	0	0	1	3
Rose Hill, KS	Wichita-Winfield, KS	0	1	1	0	0	1	3
Wellington, KS	Wichita-Winfield, KS	0	1	1	0	0	1	3
Wichita, KS	Wichita-Winfield, KS	0	1	1	0	0	1	3
Alvarado, TX	Dallas-Fort Worth, TX	1	1	1	0	0	1	4
Bridgeport, TX	Dallas-Fort Worth, TX	1	1	1	0	0	1	4
Cleburne, TX	Dallas-Fort Worth, TX	1	1	1	0	0	1	4
Dallas--Fort Worth--Arlington, TX	Dallas-Fort Worth, TX	1	1	1	0	0	1	4
Decatur, TX	Dallas-Fort Worth, TX	1	1	1	0	0	1	4

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Eagle Mountain, TX	Dallas-Fort Worth, TX	1	1	1	0	0	1	4
Hines, TX	Dallas-Fort Worth, TX	1	1	1	0	0	1	4
Midlothian, TX	Dallas-Fort Worth, TX	1	1	1	0	0	1	4
Weatherford, TX	Dallas-Fort Worth, TX	1	1	1	0	0	1	4
Corsicana, TX	other	1	1	1	0	0	1	4
Greenwood, MS	other	1	0	1	1	1	0	4
Henrietta, TX	other	1	1	1	0	0	1	4
Johnson (Beto Units), TX	other	1	1	1	0	0	1	4
Lawton, OK	other	1	1	1	0	0	1	4
Lufkin, TX	other	1	1	1	0	0	1	4
Memphis, TN--MS--AR	other	1	0	1	1	1	0	4
Munford, TN	other	1	0	1	1	1	0	4
Osceola, AR	other	1	0	1	1	1	0	4
Tennessee Colony (Coffield State Prison), TX	other	1	1	1	0	0	1	4
Waynesville, MO	other	0	0	1	1	1	1	4
Wichita Falls, TX	other	1	1	1	0	0	1	4
Winfield, KS	Wichita-Winfield, KS	0	1	1	1	0	1	4
Dallas--Fort Worth--Arlington, TX	Dallas-Fort Worth, TX	1	1	1	1	0	1	5
Decatur, TX	Dallas-Fort Worth, TX	1	1	1	1	0	1	5
Denton--Lewisville, TX	Dallas-Fort Worth, TX	1	1	1	1	0	1	5
Ennis, TX	Dallas-Fort Worth, TX	1	1	1	1	0	1	5
Gainesville, TX	Dallas-Fort Worth, TX	1	1	1	1	0	1	5
Little Elm, TX	Dallas-Fort Worth, TX	1	1	1	1	0	1	5
Malakoff, TX	Dallas-Fort Worth, TX	1	1	1	1	0	1	5
Sanger, TX	Dallas-Fort Worth, TX	1	1	1	1	0	1	5
Waxahachie, TX	Dallas-Fort Worth, TX	1	1	1	1	0	1	5
Wilmer, TX	Dallas-Fort Worth, TX	1	1	1	1	0	1	5
Butler, MO	Kansas City-Overland Park-Kansas City, M	0	1	1	1	1	1	5

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Chickasha, OK	Oklahoma City-Shawnee, OK	1	1	1	1	0	1	5
El Reno, OK	Oklahoma City-Shawnee, OK	1	1	1	1	0	1	5
Guthrie, OK	Oklahoma City-Shawnee, OK	1	1	1	1	0	1	5
Oklahoma City, OK	Oklahoma City-Shawnee, OK	1	1	1	1	0	1	5
Blackwell, OK	other	1	1	1	1	0	1	5
Duncan, OK	other	1	1	1	1	0	1	5
Enid, OK	other	1	1	1	1	0	1	5
Greenwood, MS	other	1	0	1	1	1	1	5
Hernando, MS	other	1	0	1	1	1	1	5
Lindsay, OK	other	1	1	1	1	0	1	5
Manila, AR	other	1	0	1	1	1	1	5
Marlow, OK	other	1	1	1	1	0	1	5
Palestine, TX	other	1	1	1	1	0	1	5
Ponca City, OK	other	1	1	1	1	0	1	5
Senatobia, MS	other	1	0	1	1	1	1	5
Tonkawa, OK	other	1	1	1	1	0	1	5
Waynesville, MO	other	0	1	1	1	1	1	5
Ponca City, OK	Tulsa-Bartlesville, OK	1	1	1	1	0	1	5
Arkansas City, KS	Wichita-Winfield, KS	1	1	1	1	0	1	5
Winfield, KS	Wichita-Winfield, KS	1	1	1	1	0	1	5
Athens, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Brierwood Bay, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Commerce, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Dallas--Fort Worth--Arlington, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Farmersville, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Forney, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Greenville, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Gun Barrel City, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Kaufman, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Little Elm, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Malakoff, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
McKinney, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Pilot Point, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Princeton, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Quinlan, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Royse City, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Terrell, TX	Dallas-Fort Worth, TX	1	1	1	1	1	1	6
Bald Knob, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
Beebe, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
Conway, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
England, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
Little Rock, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
Lonoke, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
Maumelle, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
Pine Bluff, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
Searcy, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
Sheridan, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
Ward, AR	Little Rock-North Little Rock-Pine Bluff	1	1	1	1	1	1	6
Gilmer, TX	Longview-Marshall, TX	1	1	1	1	1	1	6
Gladewater, TX	Longview-Marshall, TX	1	1	1	1	1	1	6
Hallsville, TX	Longview-Marshall, TX	1	1	1	1	1	1	6

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Henderson, TX	Longview-Marshall, TX	1	1	1	1	1	1	6
Kilgore, TX	Longview-Marshall, TX	1	1	1	1	1	1	6
Longview, TX	Longview-Marshall, TX	1	1	1	1	1	1	6
Marshall, TX	Longview-Marshall, TX	1	1	1	1	1	1	6
Bastrop, LA	Monroe-Bastrop, LA	1	1	1	1	1	1	6
Farmerville, LA	Monroe-Bastrop, LA	1	1	1	1	1	1	6
Monroe, LA	Monroe-Bastrop, LA	1	1	1	1	1	1	6
Chandler, OK	Oklahoma City-Shawnee, OK	1	1	1	1	1	1	6
Harrah, OK	Oklahoma City-Shawnee, OK	1	1	1	1	1	1	6
Norman, OK	Oklahoma City-Shawnee, OK	1	1	1	1	1	1	6
Oklahoma City, OK	Oklahoma City-Shawnee, OK	1	1	1	1	1	1	6
Purcell, OK	Oklahoma City-Shawnee, OK	1	1	1	1	1	1	6
Shawnee, OK	Oklahoma City-Shawnee, OK	1	1	1	1	1	1	6
Ada, OK	other	1	1	1	1	1	1	6
Alma, AR	other	1	1	1	1	1	1	6
Ardmore, OK	other	1	1	1	1	1	1	6
Arkadelphia, AR	other	1	1	1	1	1	1	6
Batesville, AR	other	1	1	1	1	1	1	6
Baxter Springs, KS	other	1	1	1	1	1	1	6
Bella Vista, AR	other	1	1	1	1	1	1	6
Bolivar, MO	other	1	1	1	1	1	1	6
Branson--Hollister, MO	other	1	1	1	1	1	1	6
Buffalo, MO	other	1	1	1	1	1	1	6
Carthage, MO	other	1	1	1	1	1	1	6
Clarksdale, MS	other	1	1	1	1	1	1	6
Cleveland, MS	other	1	1	1	1	1	1	6
Coffeyville, KS--OK	other	1	1	1	1	1	1	6
Cushing, OK	other	1	1	1	1	1	1	6
Delhi, LA	other	1	1	1	1	1	1	6
Durant, OK	other	1	1	1	1	1	1	6
Earle, AR	other	1	1	1	1	1	1	6
El Dorado, AR	other	1	1	1	1	1	1	6
Fayetteville--Springdale, AR	other	1	1	1	1	1	1	6
Forrest City, AR	other	1	1	1	1	1	1	6

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Forsyth, MO	other	1	1	1	1	1	1	6
Fort Gibson, OK	other	1	1	1	1	1	1	6
Fort Smith, AR--OK	other	1	1	1	1	1	1	6
Galena, KS--MO	other	1	1	1	1	1	1	6
Girard, KS	other	1	1	1	1	1	1	6
Greenville, MS	other	1	1	1	1	1	1	6
Greenwood, AR	other	1	1	1	1	1	1	6
Harrison, AR	other	1	1	1	1	1	1	6
Hartshorne, OK	other	1	1	1	1	1	1	6
Heavener, OK	other	1	1	1	1	1	1	6
Hollandale, MS	other	1	1	1	1	1	1	6
Hooks, TX	other	1	1	1	1	1	1	6
Hope, AR	other	1	1	1	1	1	1	6
Hot Springs Village, AR	other	1	1	1	1	1	1	6
Hot Springs, AR	other	1	1	1	1	1	1	6
Independence, KS	other	1	1	1	1	1	1	6
Indianola, MS	other	1	1	1	1	1	1	6
Itta Bena, MS	other	1	1	1	1	1	1	6
Jonesboro, AR	other	1	1	1	1	1	1	6
Jonesboro, LA	other	1	1	1	1	1	1	6
Joplin, MO	other	1	1	1	1	1	1	6
Lebanon, MO	other	1	1	1	1	1	1	6
Leland, MS	other	1	1	1	1	1	1	6
Magnolia, AR	other	1	1	1	1	1	1	6
Marked Tree, AR	other	1	1	1	1	1	1	6
Marshfield, MO	other	1	1	1	1	1	1	6
McAlester, OK	other	1	1	1	1	1	1	6
Memphis, TN--MS--AR	other	1	1	1	1	1	1	6
Miami, OK	other	1	1	1	1	1	1	6
Moorhead, MS	other	1	1	1	1	1	1	6
Mound Bayou, MS	other	1	1	1	1	1	1	6
Mount Pleasant, TX	other	1	1	1	1	1	1	6
Mountain Home, AR	other	1	1	1	1	1	1	6
Muldrow, OK	other	1	1	1	1	1	1	6
Muskogee, OK	other	1	1	1	1	1	1	6
Nacogdoches, TX	other	1	1	1	1	1	1	6
New Boston, TX	other	1	1	1	1	1	1	6
Ozark, AR	other	1	1	1	1	1	1	6
Paragould, AR	other	1	1	1	1	1	1	6
Parchman (Mississippi State Penitentiary), MS	other	1	1	1	1	1	1	6

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Paris, TX	other	1	1	1	1	1	1	6
Parsons, KS	other	1	1	1	1	1	1	6
Pea Ridge, AR	other	1	1	1	1	1	1	6
Pittsburg, KS	other	1	1	1	1	1	1	6
Poteau, OK	other	1	1	1	1	1	1	6
Prairie Grove, AR	other	1	1	1	1	1	1	6
Prescott, AR	other	1	1	1	1	1	1	6
Quinlan, TX	other	1	1	1	1	1	1	6
Republic, MO	other	1	1	1	1	1	1	6
Roland, OK	other	1	1	1	1	1	1	6
Ruleville, MS	other	1	1	1	1	1	1	6
Russellville, AR	other	1	1	1	1	1	1	6
Ruston, LA	other	1	1	1	1	1	1	6
Sallisaw, OK	other	1	1	1	1	1	1	6
Shelby, MS	other	1	1	1	1	1	1	6
Sherman, TX	other	1	1	1	1	1	1	6
Siloam Springs, AR--OK	other	1	1	1	1	1	1	6
Spiro, OK	other	1	1	1	1	1	1	6
Springfield, MO	other	1	1	1	1	1	1	6
Stillwater, OK	other	1	1	1	1	1	1	6
Sulphur Springs, TX	other	1	1	1	1	1	1	6
Tahlequah, OK	other	1	1	1	1	1	1	6
Tallulah, LA	other	1	1	1	1	1	1	6
Texarkana, TX--Texarkana, AR	other	1	1	1	1	1	1	6
Trumann, AR	other	1	1	1	1	1	1	6
Tunica, MS	other	1	1	1	1	1	1	6
West Helena, AR	other	1	1	1	1	1	1	6
West Plains, MO	other	1	1	1	1	1	1	6
Whitesboro, TX	other	1	1	1	1	1	1	6
Benton, LA	Shreveport-Bossier City-Minden, LA	1	1	1	1	1	1	6
Mansfield, LA	Shreveport-Bossier City-Minden, LA	1	1	1	1	1	1	6
Minden, LA	Shreveport-Bossier City-Minden, LA	1	1	1	1	1	1	6
Shreveport, LA	Shreveport-Bossier City-Minden, LA	1	1	1	1	1	1	6
Springhill, LA	Shreveport-Bossier City-Minden, LA	1	1	1	1	1	1	6
Vivian, LA	Shreveport-Bossier City-Minden, LA	1	1	1	1	1	1	6

Population Center	Metro Area	Caney Creek	Upper Kiamichi	Poteau Mtn	Dry Creek	Flatside	Black Fork	Total
Bartlesville, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Bristow, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Claremore, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Cleveland, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Drumright, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Glenpool, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Henryetta, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Hominy, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Mannford, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Okmulgee, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Owasso, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Pawhuska, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Skiatook, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Tulsa, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Wagoner, OK	Tulsa-Bartlesville, OK	1	1	1	1	1	1	6
Jacksonville, TX	Tyler-Jacksonville, TX	1	1	1	1	1	1	6
Lindale, TX	Tyler-Jacksonville, TX	1	1	1	1	1	1	6
Rusk, TX	Tyler-Jacksonville, TX	1	1	1	1	1	1	6
Tyler, TX	Tyler-Jacksonville, TX	1	1	1	1	1	1	6

Cities within the 250-mile Forest draw area, but outside the outer 250-mile accessibility limit to at least one wilderness within the Forest were considered to be wilderness underserved. These population centers are listed below:

Altus, OK
 Beaumont, TX
 Cairo, IL
 Caldwell, TX
 California, MO
 Cape Girardeau, MO--IL
 Cleveland, TX
 College Station--Bryan, TX
 Conroe, TX
 Corinth, MS
 Dayton, TX
 De Soto, MO
 DeQuincy, LA
 Dublin, TX
 Fulton, KY--TN

Gatesville, TX
 Grangerlan, TX
 Harrisonville, MO
 Hearne, TX
 Houston, TX
 Huntsville, TX
 Jefferson City, MO
 Killeen, TX
 Lake Charles, LA
 Lake Conroe Westshore, TX
 Liberty, TX
 Martin, TN
 McGregor, TX
 Orange, TX
 Patton Village, TX

Sedalia, MO
 Silsbee, TX
 Starkville, MS
 Stephenville, TX
 Temple, TX
 The Woodlands, TX
 Tipton, MO
 Tomball, TX
 Vernon, TX
 Vinton, LA
 Waco, TX
 West Point, MS
 Willis, TX

Forty-three population centers were identified which are not within 250-miles (wilderness underserved) of a wilderness area on the Ouachita National Forest but which are located inside the Forest's draw area. A review of other wilderness areas located within the region was completed to determine if wilderness underserved population centers may have access to wilderness outside of the Ouachita National Forest. Population Centers underserved by Ouachita National Forest Wilderness but served by other wilderness areas located within the region are displayed below:

Altus, OK: Wichita Mountains Wilderness.

Beaumont, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Cairo, IL: Sipsey Wilderness; Buffalo National River Wilderness; Leatherwood Wilderness; Big Lake Wilderness; Garden of the Gods Wilderness; Crab Orchard Wilderness; Clear Springs Wilderness; Burden Falls Wilderness; Panther Den Wilderness; Bald Knob Wilderness; Bay Creek Wilderness; Lusk Creek Wilderness; Charles C. Deam Wilderness; Bell Mountain Wilderness; Paddy Creek Wilderness; Rockpile Mountain Wilderness; Mingo Wilderness; Irish Wilderness; Devils Backbone Wilderness.

Caldwell, TX: Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

California, MO: Buffalo National River Wilderness; Leatherwood Wilderness; Buffalo National River Wilderness; Big Lake Wilderness; Upper Buffalo Wilderness; Richland Creek Wilderness; Hurricane Creek Wilderness; East Fork Wilderness; Crab Orchard Wilderness; Clear Springs Wilderness; Panther Den Wilderness; Bald Knob Wilderness; Bell Mountain Wilderness; Paddy Creek Wilderness; Rockpile Mountain Wilderness; Mingo Wilderness; Irish Wilderness; Devils Backbone Wilderness; Hercules-Glades Wilderness; Piney Creek Wilderness.

Cape Girardeau, MO: Buffalo National River Wilderness; Leatherwood Wilderness; Big Lake Wilderness; Garden of the Gods Wilderness; Crab Orchard Wilderness; Clear Springs Wilderness; Burden Falls Wilderness; Panther Den Wilderness; Bald Knob Wilderness; Bay Creek Wilderness; Lusk Creek Wilderness; Charles C. Deam Wilderness; Bell Mountain Wilderness; Paddy Creek Wilderness; Rockpile Mountain Wilderness; Mingo Wilderness; Irish Wilderness; Devils Backbone Wilderness; Hercules-Glades Wilderness.

Cleveland, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

College Station, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Conroe, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Corinth, MO: Sipsy Wilderness; Dugger Mountain Wilderness; Cheah Wilderness; Big Lake Wilderness; Garden of the Gods Wilderness; Crab Orchard Wilderness; Clear Springs Wilderness; Burden Falls Wilderness; Panther Den Wilderness; Bald Knob Wilderness; Bay Creek Wilderness; Lusk Creek Wilderness; Bell Mountain Wilderness; Rockpile Mountain Wilderness; Mingo Wilderness; Irish Wilderness.

Dayton, TX: Kisatchie Hills Wilderness; Big Slough Wilderness; Little Lake Creek Wilderness; Lacassine Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness.

DeSoto, MO: Buffalo National River Wilderness; Leatherwood Wilderness; Buffalo National River Wilderness; Big Lake Wilderness; Upper Buffalo Wilderness; Richland Creek Wilderness; Hurricane Creek Wilderness; East Fork Wilderness; Garden of the Gods Wilderness; Crab Orchard Wilderness; Clear Springs Wilderness; Burden Falls Wilderness; Panther Den Wilderness; Bald Knob Wilderness; Bay Creek Wilderness; Lusk Creek Wilderness; Bell Mountain Wilderness; Paddy Creek Wilderness; Rockpile Mountain Wilderness; Mingo Wilderness; Irish Wilderness; Devils Backbone Wilderness; Hercules-Glades Wilderness; Piney Creek Wilderness;

Dequincy, LA: Kisatchie Hills Wilderness; Lacassine Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Dublin, TX: Wichita Mountains Wilderness; Wichita Mountains Wilderness; Big Slough Wilderness; Little Lake Creek Wilderness.

Fulton, KY: Sipsy Wilderness; Buffalo National River Wilderness; Leatherwood Wilderness; Big Lake Wilderness; Garden of the Gods Wilderness; Crab Orchard Wilderness; Clear Springs Wilderness; Burden Falls Wilderness; Panther Den Wilderness; Bald Knob Wilderness; Bay Creek Wilderness; Lusk Creek Wilderness; Charles C. Deam Wilderness; Bell Mountain Wilderness; Paddy Creek Wilderness; Rockpile Mountain Wilderness; Mingo Wilderness; Irish Wilderness; Devils Backbone Wilderness.

Gatesville, TX: Wichita Mountains Wilderness; Wichita Mountains Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Grangerlan, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Harrisonville, MO: Buffalo National River Wilderness, Leatherwood Wilderness; Buffalo National River Wilderness; Upper Buffalo Wilderness; Richland Creek Wilderness; Hurricane Creek Wilderness; East Fork Wilderness; Bell Mountain Wilderness; Paddy Creek Wilderness; Devils Backbone Wilderness; Hercules-Glades Wilderness; Piney Creek Wilderness.

Hearne, TX: Kisatchie Hills Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Houston, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Huntsville, TX: Kisatchie Hills Wilderness; Big Slough Wilderness; Little Lake Creek Wilderness; Lacassine Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness.

Jefferson City, MO: Bell Mountain Wilderness; Crab Orchard Wilderness; Clear Springs Wilderness; Burden Falls Wilderness; Panther Den Wilderness; Bald Knob Wilderness; Bay Creek Wilderness; Paddy Creek Wilderness; Rockpile Mountain Wilderness; Mingo Wilderness; Irish Wilderness; Big Lake Wilderness; Hurricane Creek Wilderness; East Fork Wilderness; Devils Backbone Wilderness; Hercules-Glades Wilderness; Piney Creek Wilderness ;Piney Creek Wilderness; Buffalo National River Wilderness; Leatherwood Wilderness; Buffalo National River Wilderness; Upper Buffalo Wilderness; Upper Buffalo Wilderness; Richland Creek Wilderness.

Killeen, TX: Big Slough Wilderness; Little Lake Creek Wilderness; Turkey Hill Wilderness; Upland Island Wilderness.

Lake Charles, LA: Kisatchie Hills Wilderness; Big Slough Wilderness; Little Lake Creek Wilderness; Lacassine Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness.

Lk Conroe W. Shore, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Liberty, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Martin, TN: Charles C. Deam Wilderness; Bell Mountain Wilderness; Garden of the Gods Wilderness ;Crab Orchard Wilderness; Clear Springs Wilderness; Burden Falls Wilderness; Panther Den Wilderness; Bald Knob Wilderness; Bay Creek Wilderness; Lusk Creek Wilderness; Paddy Creek Wilderness; Rockpile Mountain Wilderness; Mingo Wilderness; Irish Wilderness; Big Lake Wilderness; Devils Backbone Wilderness; Buffalo National River Wilderness; Leatherwood Wilderness; Sipsey Wilderness.

Mcgregor, TX: ; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness; Wichita Mountains Wilderness; Wichita Mountains Wilderness.

Orange, TX: Kisatchie Hills Wilderness, A; Lacassine Wilderness, A; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Patton Village, TX: Kisatchie Hills Wilderness, LA; Lacassine Wilderness, LA; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Sedalia, MO: Bell Mountain Wilderness; Paddy Creek Wilderness; Rockpile Mountain Wilderness; Mingo Wilderness; Irish Wilderness; Devils Backbone Wilderness; Hercules-Glades Wilderness ; Piney Creek Wilderness; Buffalo National River Wilderness; Leatherwood Wilderness; Buffalo National River Wilderness; Upper Buffalo Wilderness; Richland Creek Wilderness; Hurricane Creek Wilderness; East Fork Wilderness.

Silsbee, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Starkville, MS: Big Lake Wilderness; Dugger Mountain Wilderness; Cheaha Wilderness; Leaf Wilderness; Black Creek Wilderness; Gulf Islands Wilderness; Gulf Islands Wilderness; Breton Wilderness; Breton Wilderness; Sipsey Wilderness.

Stephenville, TX: Big Slough Wilderness; Little Lake Creek Wilderness; Wichita Mountains Wilderness.

Temple, TX: Big Slough Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

The Woodlands, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Tipton, MO: Bell Mountain Wilderness; Clear Springs Wilderness; Bald Knob Wilderness; Paddy Creek Wilderness; Rockpile Mountain Wilderness; Mingo Wilderness; Irish Wilderness; Hurricane Creek Wilderness; East Fork Wilderness; Devils Backbone Wilderness; Hercules-Glades Wilderness; Piney Creek Wilderness; Piney Creek Wilderness; Buffalo National River; Wilderness; Leatherwood Wilderness; Buffalo National River Wilderness; Upper Buffalo Wilderness; Upper Buffalo Wilderness; Richland Creek Wilderness.

Tomball, TX: Kisatchie Hills Wilderness; Lacassine Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness; Little Lake Creek Wilderness.

Vernon, TX: Wichita Mountains Wilderness; Wichita Mountains Wilderness.

Vinton, LA: Kisatchie Hills Wilderness; Big Slough Wilderness; Little Lake Creek Wilderness; Lacassine Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness.

Waco, TX: Wichita Mountains Wilderness; Wichita Mountains Wilderness.

West Point MS: Big Lake Wilderness; Dugger Mountain Wilderness; Cheaha Wilderness; Leaf Wilderness; Black Creek Wilderness; Gulf Islands Wilderness; Gulf Islands Wilderness; Breton Wilderness; Breton Wilderness; Sipsey Wilderness.

Willis, TX: Kisatchie Hills Wilderness; Big Slough Wilderness; Little Lake Creek Wilderness; Lacassine Wilderness; Turkey Hill Wilderness; Indian Mounds Wilderness; Upland Island Wilderness.

Findings

Wilderness accessibility is generally excellent for all population centers located inside the Forest's draw area. Exceptions include 43 population centers (listed in the above tabulation). Most underserved areas are located at the extreme outer limit of the Forest's draw area. Although these forty-three population centers lack convenient access to wilderness areas on the Ouachita National Forest, they have adequate to abundant options for wilderness experiences in other, near-by wilderness as indicated by the accessible wilderness listings for each area, as presented above. We consider all population centers within the Ouachita National Forest draw area to be wilderness accessible and fully served for this outdoor experience.

Wild and Scenic River Analysis

The Final Supplement to the Final Environmental Impact Statement, Land and Resource Management Plan, Ouachita National Forest, volume II, March 1990 (1990 FEIS) contained an inventory and analysis of potential streams that could be included in the National Wild and Scenic River System as a part of the original Forest planning process. Fifteen separate waterways were reviewed for eligibility and suitability using criteria established in the Wild and Scenic Rivers Act and the Final Revised Guidelines for Eligibility, Classification, and Management of River Areas.

In addition to the Cossatot, Little Missouri, Saline, and Ouachita Rivers, all listed on the National Park Service's National Rivers Inventory (NRI), eleven additional streams identified by the public and other agencies and organizations were reviewed during the Forest planning process for eligibility and suitability. The Caddo, Little Cedar Creek and Cedar Creek, Mill Creek, Fourche La Fave, South Fourche La Fave, and Clearfork (all in Arkansas), and the Kiamichi River, Beech Creek, Billy Creek and Little Cedar Creek (in Oklahoma) were reviewed for Wild and Scenic designation. The Cossatot and Little Missouri Rivers were recommended for national designation in 1990. In 1992, both rivers were designated National Wild and Scenic Rivers.

The 1990 analysis found the Caddo, Ouachita, and Saline Rivers to be eligible for further consideration as National Wild and Scenic Rivers. However, the minimal Federal land ownership within the corridors of these two rivers shifts the responsibility for any additional studies from the Forest Service to the State of Arkansas. To date, no formal request by the State has been made to incorporate either river into the National System. The other streams that were reviewed in 1990 were found not to contain outstandingly remarkable values and were considered ineligible for recommendation. No waterways on the Ouachita National Forest were designated as Congressional Study Rivers.

In January 2002, the Ouachita National Forest completed a significant amendment to the Land and Resource Management Plan for acquired lands located in McCurtain County, Oklahoma (Acquired Lands EIS). An environmental impact statement (EIS) was prepared to analyze alternatives for amending the existing plan to allocate these lands to Forest management areas. The amendment also addressed the qualifications of the Glover and Mountain Fork Rivers, both listed on the NRI, for possible recommendation as Wild and Scenic Rivers. The State of Oklahoma had previously designated the segment of the Mountain Fork River from upper Broken Bow Lake to the Oklahoma-Arkansas state line as scenic under the Oklahoma Scenic Rivers Act of 1970.

The 2002 study found the Glover River, Segment I (from the confluence of East and West Forks to the National Forest boundary, 16.5 miles) to be eligible and suitable as a scenic river. Segment II of the Glover River (that part of the river south of the current National forest boundary to the confluence with Little River, 15.5 miles) is located outside the National Forest boundary, and the study recommended that this segment be studied for suitability as a possible Wild and Scenic River by the appropriate state agency. Legislation was introduced in 2004 to designate the Glover River as a National Wild and Scenic River.

The Mountain Fork River, Segment I (15.9 miles, starting at the Oklahoma–Arkansas state line and ending downstream at the Oklahoma State Highway 4 bridge), is in private ownership, and the study recommended that this segment be studied by the appropriate state agency to determine suitability. Segment II of the Mountain Fork (9.1 miles long, starting at the Oklahoma State Highway 4 bridge and ending at the upper end of Broken Bow Lake) was found to be eligible for designation as scenic due to its outstandingly remarkable scenic, recreational, fish and wildlife, geological, and archaeological/historic values. Segment II includes only 2.3 miles of National Forest System land out of its 9.1 mile length and; therefore, the study recommended that this segment be studied by the appropriate state agency to determine its suitability and make any further recommendations. Segment III (from Broken Bow Dam to U.S. Highway 70) of the river was deemed ineligible since it is not considered free flowing.

Within the Ouachita National Forest, the corridors of all rivers and streams that were determined to be potentially eligible for national designation have been carefully managed to maintain their values. The results of the original findings for the rivers and streams under the 1990 FEIS and the 2002 Acquired Lands EIS remain essentially the same. No new streams have been identified for study by the Forest or the public, and conditions have not changed appreciably in any of the previously-studied streams since the last analysis was completed. Therefore, no changes to any of the recommendations previously made or no new recommendations concerning potential wild and scenic river designations are proposed.

The analysis and findings of the 1990 FEIS and the 2002 Acquired Lands EIS remain valid and have not been revisited during this planning effort. For the complete analysis of each stream reviewed, please refer to the 1990 FEIS and the 2002 Acquired Lands EIS, on file at the Ouachita National Forest Supervisor's Office, Hot Springs, Arkansas.

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